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ABSTRACT

This document presents the proceedings and post-conference materials of the annual EDUCAUSE conference. The theme of this conference was "Thinking IT Through." Conference sessions are divided into six domains: Infrastructure and Basic Services; Teaching and Learning; Managing Information Technologies and Resources; Information Systems; New Technologies: New Capabilities, New Opportunities; and Signature Sessions: Patterns of Converging and Emerging. Print copies of abstracts and full papers of the sessions with hyperlinks are presented in this document. Topics include: cooperative projects; public-private partnerships; networking; professional development; distance education; teaching models; ownership; faculty-student interaction; decision making; IT Recruiting; computer-assisted instruction; technology integration; courseware development; information policy; educational change; digital libraries; finance and budgeting; costs; information systems design; information technology services; videoconferencing; technology's impact/role in higher education; wireless technology; and the digital divide. (AEF)

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EDUCAUSE 2000:
Thinking IT Through.
Proceedings and Post-Conference Materials
(Nashville, Tennessee, October 10-13, 2000)

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1

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EDUCAUSE 2000 PROCEEDINGS NOW ONLINE!

Corporate Participation

Events Calendar

EDUCAUSE Conferences, Seminars, & Institutes

Transforming Education Through Information Technologies

EDUCAUSE Annual Conference

Upcoming Annual Conferences

EDUCAUSE 2001
"An EDU Odyssey"
October 28-31, 2001
Indianapolis Convention Center
Indianapolis, Indiana

EDUCAUSE 2002
October 1-4, 2002
Atlanta, Georgia

EDUCAUSE 2003
November 4-7, 2003
Anaheim, California

EDUCAUSE 2004
October 19-22, 2004
Denver, Colorado

EDUCAUSE 2005
October 18-21, 2005
Orlando, Florida

Archives of Past Annual Conferences

EDUCAUSE 2000
Nashville, TN
"Thinking IT Through"

EDUCAUSE '99 Long Beach, CA
"Celebrating New Beginnings"

CAUSE98 Seattle, WA
"The Networked Academy"

EDUCOM'98 Orlando, FL
"Making the Connections"

CAUSE97, Lake Buena Vista, FL
"The Information Professions and the Information Professional"

EDUCOM'97, Minneapolis, MN
"Embracing the Changing Learning Environment"

CAUSE96, San Francisco, CA
"Broadening Our Horizons: Technology, Services, Information"

CAUSE95, New Orleans, LA
"Realizing the Potential of Information Resources: Information, Technology, and Services"

CAUSE94, Lake Buena Vista,. FL
"New Opportunities for Partnering"

CAUSE93, San Diego, CA
"Managing Information Technology as a Catalyst of Change"

EDUCAUSE 2000 PROCEEDINGS

EDUCAUSE 2000 HOMEPAGE

EDUCAUSE 2000 October 10-13

PROGRAM • REGISTRATION • CORPORATE PARTICIPATION • HOTEL & TRAVEL Nashville

Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Join us in Nashville October 10-13 For EDUCAUSE 2000

Together We'll Think IT Through

Plan now to attend the EDUCAUSE 2000 Conference at Nashville's fabulous Opryland Hotel.

EDUCAUSE is consistently rated as higher education's premier information technology conference

General Session Speakers:
Judy Estrin - Sponsored by ABT, Inc.
David Halberstam - Sponsored by NEC America, Inc.
Dave Barry - Sponsored by Blackboard, Inc.

The EDUCAUSE 2000 Program Page offers a full listing of the conference track sessions, preconference seminars, constituent group meetings and much more.

Use the Itinerary Builder, the Knowledge Pathfinder, and the Corporate Exhibit Hall Guide to plan your conference and maximize your professional development potential.

WILDHORSE SALOON

Don't miss this year's main social event, the Roundup at the Wildhorse Saloon, from 7 to 11 p.m. Thursday October 12th, in downtown Nashville, an indoor/outdoor extravaganza featuring the Neville Brothers, area bands, food, refreshments, line dancing and games. Sponsored by Microsoft Corporation and PeopleSoft, Inc.

NOTICE: Many of the EDUCAUSE 2000 Hotels are currently full. Please contact the hotel of your choice listed on the Hotel & Travel page and be placed on the waiting list as rooms may become available at the other hotels.

EDUCAUSE will be providing complimentary transportation from all the hotels listed to the Opryland Hotel and Convention Center. Please see the Shuttle Schedule for information.

OPRYLAND HOTEL
CONVENTION CENTER

The Opryland Hotel is a conference site you won't want to miss

NASHVILLE: Country Music's Capital. Check out the Nashville scene - clubs, restaurants, shopping and much more at the Nashville Convention and Visitors' Web Site.

REGISTRATION
Preregistration (online, phone, fax, email, etc.) for the EDUCAUSE 2000 conference is closed. If you are planning to attend you can register on site at Opryland Hotel and Convention Center beginning on Monday, October 9, at 8:00 a.m. If you have any questions, or if you want to change or cancel your existing registration, please contact EDUCAUSE Customer Service.

CORPORATE PARTICIPATION

This year's conference features more than 150 corporate participants, some of the nation's foremost technology companies. Corporate exhibitors provide workshops and presentations, display their goods and services and sponsor opening hospitality parties on Tuesday evening.

Program | Registration | Corporate Participation | Hotel & Travel
EDUCAUSE 2000 Home Page | EDUCAUSE Home Page

EDUCAUSE 2000
PROCEEDINGS

EDUCAUSE 2000
HOMEPAGE

EDUCAUSE 2000 October 10-13

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Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Proceedings and Post-Conference Materials For EDUCAUSE 2000 October 10-13

The EDUCAUSE 2000 conference generated a wealth of timely and interesting material on all aspects of information technology in higher education.

Conference Presentations
Presentations from this year's conference are available online as papers or in presentation format. Audio for some of the presentations is available through the library. Cassette tapes of the presentations can be purchased through the Recorded Resources Corporation. Call (410) 969-TAPE for more information.

General Session: Thursday, 9:45 - 11:15 a.m.
Judy Estrin, Sponsored by ABT, Inc.(Real Video)

Awards Video
You can view the conference Awards Video online in RealAudio format.

Constituent Group Discussions
The EDUCAUSE 2000 Conference featured wide-ranging Constituent Group discussions. More information about EDUCAUSE Constituent Groups, including minutes of most EDUCAUSE 2000 meetings, is available on the Constituent Group page. Among the many topics covered by the discussions are issues relating to Chief Information Officers and Registrars, Data Administration, Teaching and Learning, Decision Support/Data Warehousing, Electronic Records Management, Library/IT Partnerships, Multimedia, and Network Management.

Current Issues Roundtable Discussions
Reports from 10 of the Current Issues Roundtables held at EDUCAUSE 2000 are now online. Links to the reports have been added to descriptions of the sessions. Among the sessions linked to full reports are *Advanced Networking: How Much Is Enough?; Enterprise Information Portals; Electronic Learning Environments: Assessing Educational Outcomes; Electronic Classrooms and Buildings of the Future; E-Business: Is It Any Less Complex in a Small College?; and Distance Education: How Do You Know It's Right For Your College?*

Pictures of E2000
Be sure to check out the pictures of this year's conference, held in the Opryland Hotel and Convention Center. Our Web site offers a variety of images: our state-of-the-art registration system, on-site computer banks, and the conference exhibit hall.

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E2000 PROGRAM
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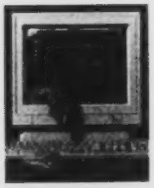
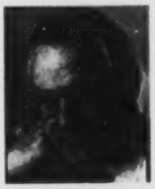
General Session Speakers



Dave Barry
Opening Address
8:15 a.m. - Wednesday
General Session
Sponsored by Blackboard, Inc.

Judy Estrin
9:45 a.m. - Thursday
General Session
Sponsored by ABT, Inc.



David Halberstam
10:30 a.m. - Friday
General Session
Sponsored by NEC America, Inc.

Participants consistently praise the annual EDUCAUSE Conference for the outstanding quality of its principal speakers and the superior content of the track sessions offered.

This year's conference features general session speakers Dave Barry, Judy Estrin and David Halberstam, three different perspectives from three dynamic personalities. Follow the links above to read their biographies.

Track Sessions

The track sessions covering six principal areas are the heart and soul of the conference. Expert presenters lead informative discussions on a wide range of subjects - from practical solutions to theoretical constructs. Excellent facilities and supporting technology enhance the learning experience.

Follow these links to the track session descriptions:

- Infrastructure and Basic Services
- Teaching and Learning
- Managing Information Technologies and Resources
- Information Systems
- New Technologies: New Capabilities, New Opportunities
- Signature Sessions: Patterns of Converging and Emerging
- EDUCAUSE Track

Preconference Seminars

Don't wait to sign up for more than 35 Preconference Seminars set for Tuesday, October 10. These half-day and full-day seminars provide an in-depth look at current issues of importance to everyone involved in information technology: network administrators, librarians, faculty, support personnel, directors and managers. Click here for a full list of this year's seminars. These popular seminars fill fast, so register soon. To check the availibility of the current pre-conference seminars, check here.

Plan Your Program

The best way to plan your conference schedule is to use our Itinerary Builder, which allows you to chart, save, update, download and print your conference schedule before you get on the plane to Nashville.

The EDUCAUSE 2000 conference is structured to allow you to "customize" your professional development by taking advantage of open-ended and interlocking arrays of program options. The following links will lead you to the full conference schedule. It lists all events except corporate exhibits.

- Monday Schedule
- Tuesday Schedule
- Wednesday Schedule
- Thursday Schedule
- Friday Schedule

- Constituent Group Meetings (At a glance)
- Current Issues Roundtables (At a glance)
- Committee and Ancillary Meetings (At a glance)
- Poster Sessions (At a glance)
- Awards
- E2000 Program Committee

Corporate Participation

More than 150 corporate exhibitors will sponsor a wide range of activities including corporate workshops and presentations. Corporate participants also sponsor events such as the Tuesday evening hospitalities and the main conference social event on Thursday evening, Roundup at the Wildhorse Saloon. Find out more about corporate participation on our Corporate Participation Page.

EDUCAUSE thanks Microsoft Corporation and PeopleSoft, Inc. for sponsoring the Roundup at the Wildhorse Saloon, on Thursday evening.

Fees and Registration Information

Registration for EDUCAUSE 2000 takes only a few minutes if you follow the link to our Registration Page. For more information on the conference hotel and travel, follow the link to our Hotel & Travel Page.

Presenter Information

If you're making a presentation at EDUCAUSE 2000, you need to visit the presenter pages where we have listed important information and have some forms for you to fill out.

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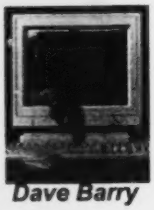
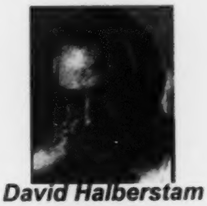
General Session Speakers



Dave Barry



David Halberstam

Judy Estrin

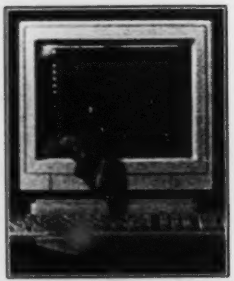
Dave Barry

Sponsored by Blackboard, Inc.

Wednesday, 8:15 - 9:45 a.m.

Dave Barry was born in Armonk, New York, in 1947 and has been steadily growing older ever since without actually reaching maturity. He attended public schools, where he distinguished himself by not getting in nearly as much trouble as he would have if the authorities had been aware of everything. He is proud to have been elected Class Clown by the Pleasantville High School class of 1965.

Barry went to Haverford College, where he was an English major and wrote lengthy scholarly papers filled with sentences that even he did not understand. He graduated in 1969 and eventually got a job with a newspaper named--and this is the real name--*The Daily Local News*, in West Chester, Pennsylvania, where he covered a series of incredibly dull municipal meetings, some of which are still going on.



In 1975, Barry joined Burger Associates, a consulting firm that teaches effective writing to businesspersons. He spent nearly eight years trying to get various businesspersons to "for God's sake stop writing things like 'Enclosed please find the enclosed enclosure,'" but he eventually realized that it was hopeless. So, in 1983 he took a job at the *Miami Herald*, and he has been there ever since, although he never answers the phone. In 1988 he won the Pulitzer Prize for commentary, pending a recount. His column appears in several hundred newspapers, yet another indication of the worsening drug crisis.

In 1996 Barry married Michelle Kaufman, a sportswriter for the *Miami Herald*. He has a son, Robert, who recently got his driver's license, which should make everybody nervous.

Barry has written a number of short, but harmful, books, including *Babies and Other Hazards of Sex* and *Dave Barry Slept Here: A Sort Of History of the United States*. His books, including *Dave Barry is from Mars AND Venus*, *Dave Barry's Book of Bad Songs*, *Dave Barry in Cyberspace*, *Dave Barry's Complete Guide to Guys*, *Dave Barry Turns 40*, and *Dave Barry Turns 50* have been hailed by the critics as "containing a tremendous amount of white space."

The CBS television series *Dave's World* was based on two of Barry's books; the show has been cancelled, but for the time being his life continues. Also, he set fire to a pair of underpants with a Barbie doll on national television and owns a guitar that was once played by Bruce Springsteen.

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David Halberstam

Sponsored by NEC America, Inc.

Friday, 10:30 - 11:30 a.m.

David Halberstam is a legendary figure in American journalism. His landmark trilogy of books on power in America, *The Best and the Brightest*, *The Powers That Be* and *The Reckoning* have helped define the latter part of this century more than any journalistic works, and have won him innumerable awards as well as broad critical acclaim. They deal with, respectively, the path that the Kennedy-Johnson administrations used to take to war in Vietnam, the dramatic and sudden rise of the power of modern media and the ascent of the Japanese as a rival economic superpower.

Halberstam's book, *The Next Century*, defines the American agenda in our journey toward the year 2000. *The Fifties* examines a decade Halberstam views as seminal in shaping the America of today. *Publisher's Weekly* said of *The Fifties*, "[it looks] behind the facade of affluence, leisure, familiar bliss and unsurpassed lawn care...Those concerned about the '90's - indeed about the postwar era - should read *The Fifties*." In 1997 David Halberstam's *The Fifties*, an eight part series based on his book, was broadcast nationally on cable television's The History Channel.

He is the author of 11 bestselling books. *The Reckoning*, his prophetic account of the Japanese challenge, was voted in a *Wall Street Journal* poll of 400 CEOs The Most Important Book of the Year. The breadth of Halberstam's work is demonstrated by the vastly different subjects of two of his books that were number one on the best sellers list: *The Best and the Brightest*, and 17 years later, *Summer of '49*, a nostalgic look at a pennant race - and a very different America - which existed forty years ago.

In 1998 Halberstam released *The Children*, which chronicles the lives of eight young, courageous civil rights activists he met in 1960 as a reporter for *The Nashville Tennessean*. In January 1999 he released a biography of Michael Jordan entitled, *Playing for Keeps: Michael Jordan and the World He Made*.

David Halberstam graduated from Harvard, where he served as managing editor of the daily *Harvard Crimson*. He began his career as the one reporter on the *Daily Times Leader* in West Point Mississippi and later at *The Nashville Tennessean* before joining *The New York Times* in 1960. He first came to national prominence in the early sixties as part of a small handful of American reporters who reused to accept the official optimism about Vietnam and who reported that the war was being lost.

Halberstam's reporting so annoyed President Kennedy that the latter asked the publisher of *The New York Times* to transfer him to another bureau. At the age of 30, for his reporting on Vietnam, David Halberstam was awarded The Pulitzer Prize.

Harper's magazine has called Halberstam "a legend in American journalism." *Newsday* has praised him as simply "one of our great reporters," and Bob Woodward from Watergate fame has called him "the journalistic father to a generation of us who went into the profession because of what he did in Vietnam." *The Washington Post* has referred to Halberstam as "The journalist as samurai."

David Halberstam has been called "this generation's equivalent of Theodore White and John Gunther" by *The Boston Globe* and his books have received much critical acclaim. Critics called *The Best and the Brightest* "a rich, entertaining and profound reading experience" (*The New York Times*); *The Powers That Be*, "moves with all the speed and grace of a fine novel" (*Chicago Tribune*); *The Reckoning*, "Halberstam manages to write business history with an investigator's skill and a novelist's flair" (*The Washington Post*); *The Amateurs*, "one of the best books ever written about sport" (*Newsweek*); *Summer of '49*, "dazzling...a celebration of a heroic age" (*The New York Times*); *October 1964*, "masterful...memorable" (*The Washington Post*); *The Children*, "in Mr. Halberstam's hands, the early days of the civil rights movement come to life as never before in print" (*The Wall Street Journal*); and about *Playing For Keeps: Michael Jordan and the World He Made*, "Halberstam has written an excellent book about the game of basketball and its greatest player" (*Publisher's Weekly*).

Judy Estrin

Sponsored by ABT, Inc.

Thursday, 9:45 - 11:15 a.m.

Judy Estrin is Chief Executive Officer of Packet Design, Inc., a company focused on technology to scale the Internet. Prior to cofounding Packet Design in May, 2000, Judy was Chief Technology Officer and Senior Vice President at Cisco Systems. At Cisco, she was responsible for strategic technology planning and business development including investments and acquisitions, consulting engineering and advanced Internet projects, as well as legal and government affairs. Ms. Estrin joined Cisco through the acquisition of Precept Software, a leading multimedia networking software company, of which she was CEO and a co-founder. Previously, she was President and CEO of Network Computing Devices (NCD), a leading supplier of X terminals and PC-to-UNIX connectivity software. Prior to NCD, she was a cofounder of Bridge Communications, a pioneer in internetwork routers, bridges and communication servers, which merged with 3Com in 1987.

Ms. Estrin holds B.S. degrees in Mathematics and Computer Science from UCLA and a master's degree in Electrical Engineering from Stanford University, where she was involved in early development of the TCP/IP protocols. Ms. Estrin sits on the Board of Directors of Federal Express, Sun Microsystems, and The Walt Disney Company.

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Program | Registration | Corporate Participation | Hotel & Travel
EDUCAUSE 2000 Home Page | EDUCAUSE Home Page

EDUCAUSE 2000 October 10-13
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Domain (track) Descriptions

Clicking on the track title will take you to a list of presentations for that track. From there you can get to the presenters' names, time for the presentation, and the presentation abstract.

Domain 1: Infrastructure and Basic Services

It's 2000 and the various technologies, discrete services, and data processing paradigms from the last decade have coalesced into a critical infrastructure underlying most campus activities. What used to be futuristic, new technologies are now basic services with expectations of 24 X 7 availability. Despite the daunting challenge, it is time to deliver on all those "in the future" promises. No problem! -- that is, aside from a few outstanding questions. For example: How do we architect, implement and manage in this new world? How do we scale up to meet seemingly endless demand? How do we measure success and continuously improve on service delivery? How do we rise above the turmoil of vendor acquisitions and the challenge of technological diversity? How do we deal with security, privacy, intellectual property and issues in converged organizations? How can we afford to keep the promises? How can we afford not to?

Coming together begins the journey. The presentations in this domain should answer questions about today's and tomorrow's basic IT services and foundation technology, including the strategies that make it all work. Foundational infrastructure includes voice and video as well as data networking. Above the foundation are the core services that enable communication, collaboration, computation, and administration. The range of these services is almost boundless, from network-based services (directories, e-mail, groupware, security, massive data storage, resource management tools, distributed learning environments) and maintenance of the physical infrastructure (wired and wireless, hardware and software, backrooms and classrooms) to user support for all segments of the community. These services exist in a context of rapid change, converging technologies, increasing complexity, rising expectations, expanding usage, and seemingly endless expense. For successful service delivery, sophisticated deployment of technology and staff is required. Presentations that address infrastructure and/or service issues in innovative, scalable, converged and/or transferable ways are especially solicited. The message should appeal to administrators who manage basic services and/or to technologists who create and maintain this infrastructure. Together we can keep the promises.

Domain 2: Teaching and Learning

The role of technology in teaching and learning has emerged as one of the central issues in higher education. New, sometimes unfamiliar, players are staking out positions in higher education as developers of learning technologies and educational programs. Meanwhile, the forces of digital media, Internet technologies, and faculty interests are converging to create new synergies on our campuses. As leaders in educational technology, we have always been instruments of change on our campuses. But we are finding many new questions emerging as a result of these recent developments.

Throughout the 1990s, learning technology developers have attempted to create "sustainable and scalable" systems for our campuses. How well have we succeeded? What new tools or techniques are emerging for more effective uses of technology in instruction? What best practices exist for bringing faculty, IT, and library staff together to identify or create robust learning environments for our campuses? What new campus players (or off-campus partners) are teaming with us in these efforts? What evidence is emerging that Java or Object-Oriented Programming techniques have become effective tools-of-choice in our profession? Are these tools bringing significant advantages to our development work? If so, how is this affecting the required skill sets staff in the learning technologies area? What types of pedagogical tools are being developed for use with digital libraries and online archives? How are we preparing to use the substantial electronic resources that will be built by the current round of NSF Digital Libraries Phase 2 grants? Web-based Course Management Systems are being deployed at many colleges and universities. What have we learned from the first phase of deployment of these systems? Have these systems helped us to "Cross the Chasm" in bringing effective technologies to a significantly larger faculty community? What should we architect for the second-generation of these systems?

Developing effective instructional materials for online delivery in particular is an expensive undertaking. What trends are emerging that help to contain the costs of development while maintaining pedagogical effectiveness? Have consortial efforts among universities proved successful in this area? There is an emerging trend for outsourcing online course development through such corporate groups as eCollege and others. Is this simply another strategy for effective development or are we selling our souls in search of quick solutions? How are these new efforts faring with our faculty and our students?

What, finally, has been the impact of technology on teaching and learning?

What new roles are emerging for faculty in technology-rich courses:facilitator? "guide on the side"? content provider? What emerging strategies use technology effectively to engage students in active learning?

Proposals for the domain of teaching and learning should address these questions with an emphasis on providing answers and solutions supported by sound methodology, research, and/or best practices.

Domain 3: Managing Information Technologies and Resources

The challenge is daunting. Organizing, managing, and leading information technology services in higher education draws on an individual's technical as well as human resource skills in an environment where it seems technology changes faster than the weather. We seek proposals that address the major challenges faced in managing the IT organization. If you have successful strategies for recruiting and retaining IT staff, ideas about how to develop new IT managers, or ways of coping with the high-stress, fast-paced environments in which we all work, your colleagues would like to hear from you.

Present your ideas about how to keep motivation high for staff and project directors introducing and supporting very visible, enterprise-wide, commercial systems. How do these teams manage users' expectations for customized implementations as well as their simultaneous eagerness to avoid change? What are the appropriate roles and responsibilities of technology managers and functional managers in these large projects? Should IT or functional units be leading these projects and championing the changes needed for success?

We are also interested in your experiences in developing the strategic direction for IT at your institution. How have you built consensus among IT staff, faculty, administration, senior executives, and governing boards to align the mission of IT with that of the institution? How do you manage to sing the "strategic direction" song as a collective voice?

IT has become a core component of university and college infrastructure, and administrators at institutions of all sizes and relative affluence struggle with how to pay for it all. What kinds of funding models are in place at your institution to support IT? What has changed in the last few years? Are more IT services being outsourced? Are expenses being distributed in new ways? What have been the results?

Helpful discussions about a full range of topics related to leadership and management--including how to know the difference between the two--are welcome. Project management techniques, including tips, pitfalls, and success stories, will help your colleagues benefit from your experiences.

Domain 4: Information Systems

As the Y2K crisis passes, those who create and manage information systems find themselves at the convergence of new pressures, new opportunities, and new challenges. Senior officers and governing boards expect us to be a driving force in making our administrative units increasingly more cost effective. End-users--not only from within the campus administration, but also from the faculty, our "Net Generation" students and their families--expect us to keep delivering on the potential of digital technology.

Our administrative processes are no longer being measured against the college or university down the road, but against companies like Amazon.com, eBay and The Gap. How do we keep up? How do we reconcile the pressure to be increasingly cost effective, the pressure to provide leading edge services, the pressure to think and plan strategically, and the pressure to remain nimble and flexible in the face of increasing change?

We invite proposals that speak to key topics of interest to you and your colleagues. Proposals of particular interest will focus on the challenges of implementing ERP systems; opportunities for collaboration and partnering; pressing issues in security and authentication; new directions for system selection and application development; innovative models for distributed and centralized support; emerging possibilities for intranets, extranets and e-commerce; potential roles for application service providers (ASPs) and remote "hosting services"; and new approaches to project management, work flow, data warehousing, outsourcing, and benchmarking.

Domain 5: New Technologies: New Capabilities, New Opportunities

Our business is constantly changing as new technologies offer new capabilities and new applications for our faculty, students, and staff. High-performance computing and advanced networking are merging to form seamless virtual environments. Intelligence in the network is changing the way our faculty and students work. In the welter of new product announcements and ever more enticing promises of what's to come, colleges and universities are hard-pressed to make decisions that are both strategic and cost-effective. What are the critical emerging technologies and their capabilities? What are the real opportunities they provide for academia? What is the role of Internet2 for the mainstream as well as the cutting-edge campuses--and how soon will we feel its impact? How do we incorporate these new technologies into a robust and reliable campus environment? How can we plan ahead to prepare for some of the changes that these new technologies will enable?

We specifically seek presentations on leading-edge, high-performance computing and communications technologies, and especially on their applications and management, with a goal of helping attendees understand new developments and prepare to support them. Topics of particular interest include applications and support of virtual environments, middleware, data mining, remote instrument control, collaboratory environments with integrated voice/data/video, enterprise storage solutions, and supercomputing "for the rest of us." What is the state-of-the-art in high-performance computing systems and networking? How are they used in research and teaching? What resources are available and how can our faculty and students get access to them? What are the "killer apps" for high-performance computing and networking, and particularly for integrated systems? What incentives and support are available to help push the envelope within academe?

Domain 6: "Signature" sessions: Patterns of converging and emerging

Finally, the committee seeks a group of proposals for sessions that reflect directly on the conference theme from a variety of perspectives. For instance, the Internet enables many institutions to come together in virtual spaces and form new communities: universities, colleges, K-12 schools, libraries, museums, community-based organizations, small businesses, and even corporations. How are these new communities being established? What opportunities for outreach and public service do they offer, and what are the barriers to their success?

Or, consider the ways in which technologies, services, and even individual careers are converging across the spectrum of our profession. How successful are the newly emerging processes and practices? What are the points of collision, and how can the impact be minimized, if not avoided? What are the emerging opportunities, both practical and visionary, that will guide us forward? Debates between presenters and provocative ideas that stimulate audience interaction are particularly welcome, as are innovative presentations that showcase digital media and offer unique formats for expression, collaboration, and analysis.

EDUCAUSE Track

Despite efforts to make certain that the critical issues of the day are covered at the conference, the call for proposals process doesn't always allow us to achieve that goal. Therefore, to ensure that such critical areas are addressed, we've developed the EDUCAUSE track.

The EDUCAUSE track offers a wonderful mix of sessions that are a great complement to the rest of the EDUCAUSE 2000 program. Several of the sessions report specifically on association activites and initiatives.

We look forward to coming together in Nashville to think IT through together. We expect the convergence of critical thinking, the sharing of ideas, and the chance to network with our colleagues will provide an opportunity for us all to emerge with new energy and enthusiasm to lead our organizations through the challenges that lie ahead.

Program | Registration | Corporate Participation | Hotel & Travel
EDUCAUSE 2000 Home Page | EDUCAUSE Home Page

EDUCAUSE 2000 PROCEEDINGS

EDUCAUSE 2000 HOMEPAGE

EDUCAUSE 2000 October 10-13

PROGRAM • REGISTRATION • CORPORATE PARTICIPATION • HOTEL & TRAVEL Nashville

Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Monday, October 9

8:00 a.m. - 5:00 p.m.	Registration Desk Open
11:00 a.m. - 5:00 p.m.	Speaker Staging Room Open
4:30 p.m. - 6:00 p.m.	**Meeting** : E2000 Program Committee

Tuesday, October 10

7:00 a.m. - 4:00 p.m.	Speaker Staging Room Open
7:00 a.m. - 8:00 p.m.	Registration Desk Open
7:15 a.m. - 8:15 a.m.	**Meeting** : Breakfast for Preconference Seminar Presenters and Conveners
8:00 a.m. - 10:00 a.m.	**Meeting** : Advisory Group on Administrative Information Systems and Services (AGAISS)
8:30 a.m. - 12:00 p.m.	**Morning Seminar** : Seminar 1A - Revising Workflow: Something Old, Something New...
	Morning Seminar : Seminar 2A - Service, Management, and Leadership: An Essential Toolkit for IT Administrators
	Morning Seminar : Seminar 3A - How to Incorporate Ethics into the Learning Goals of a Computer Science Technology Degree: A Modular Approach
	Morning Seminar : Seminar 4A - Teaching, Learning, Technology Centers: Toward Collaboration in Bits and Mortar
	Morning Seminar : Seminar 5A - CourseInfo (Blackboard 5.0) and WebCT: A Side-by-Side Comparison
	Morning Seminar : Seminar 6A - Public Key Infrastructure in Higher Education
	Morning Seminar : Seminar 7A - Working with Consultants: How to Successfully Select and Manage External Resources for Your IT Organization
	Morning Seminar : Seminar 8A - The Rights Stuff: Ownership in the Digital Academy
	Morning Seminar : Seminar 9A - Campus-wide Planning for Business Continuity and Emergency Operations

	Morning Seminar : Seminar 10A - Tips and Tricks for the Development, Delivery, and Support of Online Courses
	Morning Seminar : Seminar 11A - With Whom Should We Dance? When to Share and When to Outsource
	Morning Seminar : Seminar 12A - Influence of IT on Higher Education Design
	Morning Seminar : Seminar 13A - Understanding the Social, Economic, and Workforce Issues Associated with Information Technology
8:30 a.m. - 4:30 p.m.	**Full-Day Seminar** : Seminar 1F - E-Business: Architecture Overview and Some Issues for Higher-Education
	Full-Day Seminar : Seminar 2F - Theoretical Foundations of Multimedia
	Full-Day Seminar : Seminar 4F - Digitizing Research Collections for Access
	Full-Day Seminar : Seminar 5F - The Digital Library: Architecture for Learning in the 21st Century
	Full-Day Seminar : Seminar 6F - Creating Knowledge Management Portals on your Desktop with Microsoft Office 2000
	Full-Day Seminar : Seminar 7F - Putting Your Stuff (and Your User's Stuff) on the Web
	Full-Day Seminar : Seminar 8F - Project Planning for Ubiquitous Computing: A Case Study of Ubiquitous Computing at Seton Hall University
	Full-Day Seminar : Seminar 9F - Assessing the Impact of Technology on Student Learning: Preparing Students for What?
	Full-Day Seminar : Seminar 10F - Designing and Implementing Champion Web Projects: A Guide for IT Managers
10:00 a.m. - 12:00 p.m.	**Meeting** : Publications Advisory Committee
11:00 a.m. - 6:00 p.m.	**Meeting** : Ivy Plus EDUCAUSE
11:30 a.m. - 1:30 p.m.	**Meeting** : Member Services Committee
12:00 p.m. - 3:00 p.m.	**Meeting** : EQ Editorial Committee
12:00 p.m. - 4:00 p.m.	**Meeting** : Current Issues Committee
1:00 p.m. - 4:30 p.m.	**Afternoon Seminar** : Seminar 1P - Developing Portals
	Afternoon Seminar : Seminar 2P - Introduction to Middleware 101

	Afternoon Seminar : Seminar 3P - Effective Strategies for Teaching and Learning Online
	Afternoon Seminar : Seminar 4P - Designing and Implementing Faculty Development Programs
	Afternoon Seminar : Seminar 6P - Using the Web in Teaching and Learning: Innovative Uses of Web CT
	Afternoon Seminar : Seminar 7P - Charting a Course through Digital Seas: Developing an Integrated Technology Plan for the Small Campus
	Afternoon Seminar : Seminar 8P - Designing an Effective Customer Assessment Program
	Afternoon Seminar : Seminar 10P - Robbing Peter to Pay Paul (and Other Approaches to Telephone and Data-Network Rate Setting)
	Afternoon Seminar : Seminar 11P - Graduating Liberal Arts Students with Sophisticated Technology Skills
	Afternoon Seminar : Seminar 12P - Ownership of Electronic Course Materials: Issues, Trends, and Coping with Change
	Afternoon Seminar : Seminar 13P - How Recent Government Initiatives Will Impact IT on Your Campus
1:00 p.m. - 5:00 p.m.	**Meeting** : Frye Fellows
	Meeting : EDUCAUSE Board of Directors
1:30 p.m. - 4:00 p.m.	**Constituent Group** : Chief Information Officers (First Session)
2:00 p.m. - 6:00 p.m.	**Meeting** : Recognition Committee
3:00 p.m. - 4:30 p.m.	**Constituent Group** : Users of PeopleSoft Applications (Current Users)
3:00 p.m. - 6:00 p.m.	**Exhibit Hall Open**
4:00 p.m. - 6:00 p.m.	**Constituent Group** : Data Administration (First Session)
	Meeting : Writing for *EDUCAUSE Quarterly* Workshop A public workshop for those interested in writing for *EQ*, the EDUCAUSE practitioner's journal
4:30 p.m. - 6:00 p.m.	**Meeting** : Information Resources Committee
5:30 p.m. - 7:00 p.m.	**Meeting** : Professional Development Committee
	Meeting : Nomination & Election Committee
6:00 p.m. - 7:00 p.m.	**Meeting** : Newcomers Orientation
7:00 p.m. - 10:00 p.m.	**Hospitality** : Dell Computer Corporation

Hospitality : George Washington University - GWU and Prometheus Sponsor "Champagne, Strawberries and CIOs"

Hospitality : Nortel Networks

Hospitality : Rock 'n Roll with SCT, WebCT, and Campus Pipeline, Inc.

Hospitality : Relax with Sun Microsystems, Inc.!

Hospitality : Toshiba America Computer Systems Division and Convene.com Invite you to join in a Hot Country Night

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Wednesday, October 11

7:00 a.m. - 8:00 a.m.	**Meeting** : Breakfast for Wednesday Speakers, Conveners, and Domain Coordinators
7:00 a.m. - 6:00 p.m.	Registration Desk Open
8:00 a.m. - 5:00 p.m.	Speaker Staging Room Open
8:15 a.m. - 9:45 a.m.	**General Session** : Dave Barry, Columnist and Author - Sponsored by Blackboard, Inc. Education: Bad Idea or What?
9:30 a.m. - 5:00 p.m.	**Corporate Exhibits Open**
9:45 a.m. - 10:30 a.m.	Refreshment Break in the Exhibit Hall - Sponsored by University Business Magazine
10:30 a.m. - 11:15 a.m.	**Domain 1** : Equipping Faculty for Success with Technology
	Domain 1 : Learning Village: Connecting Homes, Campuses, and People
	Domain 2 : Beyond Gravity
	Domain 2 : Exchanging Messages or Meeting Minds?
	Domain 2 : What It Takes: New Roles, Competencies and Models for Implementing Online Distance Education
	Domain 3 : New Beginnings II: The Realities of a New Senior Level IT Position
	Domain 4 : Data Models for a Registrar's Data Mart
	Domain 4 : Experiences Integrating B2B E-Commerce with Campus Information Systems
	Domain 5 : Media-Rich Learning through Universal Computing and Wireless Thin Client

Domain 5 : Reaping the Benefits from a Campus ATM Converged Network

Domain 6 : Access and Innovation: Partnering to Train Professional Workforce Educators

Domain 6 : Portals: Business, Student Information, and Learning Drivers

Domain 6 : The Three Sisters of Kentucky: A Virtual Triad of Excellence and Possibilities

EDUCAUSE Domain : The EDUCAUSE Task Force on System Security: Initial Focus and Opportunities for Participation

Corporate Presentation : Dell Computer Corporation - Path to Success in eLearning

Corporate Presentation : SCT - 21st Century Infrastructure for Higher Education

Corporate Workshop : Apple Computer, Inc. - An Introduction to Microsoft Office 2001

Corporate Workshop : Blackboard, Inc. - Building Courses in Blackboard 5
Hardware provided by Dell.

Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Creating Rich Streaming Media Content

Corporate Workshop : Oracle Corporation - Building a Website with Oracle Portal

Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting

Corporate Workshop : Sun Microsystems, Inc. - Grid Computing

11:45 a.m. - 12:30 p.m.

Domain 1 : Interactive Distance Learning without Barriers

Domain 1 : Planning, Implementing, Supporting, and Assessing a Computer Ownership Policy for Students

Domain 2 : I Can't Define a Great Online Course but I Know When I See One: Lessons To Date

Domain 2 : Venturing Online: Developing and Implementing an E-Learning Strategy

Domain 3 : Council on Library and Information Resources

Domain 3 : Distance Education as a Business within a University

Domain 4 : Building Whistler City: Distributed Web

Registration for PeopleSoft Using IBM WebSphere on Linux

Domain 4 : E-Commerce@MIT

Domain 4 : Higher Education ERP: Lessons Learned

Domain 5 : Java Pays: Delivering a Mission-Critical Enterprise Time Collection System that Works

Domain 5 : Public Key Infrastructure

Domain 6 : Consortial IT Services: Collaborating to Reduce the Pain

Domain 6 : E-Business: A Vision and Strategy for the University of Minnesota

Domain 6 : Who's Who, Who Isn't, What They Can Do, and How

Corporate Presentation : IBM Corporation - IBM e-business Solutions for Higher Education

Corporate Presentation : PeopleSoft, Inc. - Connecting People and Information: Your Competitive Edge in the Knowledge Economy

Corporate Workshop : Apple Computer, Inc. - Lights, Camera, Learning! Making Desktop Movies for Courseware

Corporate Workshop : Blackboard, Inc. - Collaborative Learning
Hardware provided by Dell.

Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Creating Educational Workspaces using Digital Dashboards

Corporate Workshop : Oracle Corporation - Oracle Internet Procurement

Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting

Corporate Workshop : Sun Microsystems, Inc. - Building a Digital Library

12:30 p.m. - 2:00 p.m. **Meeting** : SAC Program Committee

12:30 p.m. - 2:15 p.m. Birds of a Feather

Meeting : Net@EDU Lunch

Meeting : Network Award Committee

Lunch in the Exhibit Hall

12:45 p.m. - 2:15 p.m. **Constituent Group** : Administrative and Campus Computing Environments at Small Schools (ACCESS)

[redacted]

(FTE <1,000)

Constituent Group : Administrative Systems Management

Constituent Group : Decision Support/ Data Warehousing (First Session)

Constituent Group : IT Collaboration in State Systems

Constituent Group : Registrars

Constituent Group : Software Licensing

Constituent Group : User Services

Constituent Group : Library/IT Partnerships

Meeting : NERCOMP Board

2:15 p.m. - 3:00 p.m.

Domain 1 : From Genesis to Infinity: Zero to 50,000 Online Students in Two Years

Domain 1 : Leveraging Your State Universities' Software Licensing to the Max: Opportunities, Benefits and Retrospective Review

Domain 2 : Blackboard and PeopleSoft Integration: Lessons from the Front Lines

Domain 2 : Courseware Development for Distance Education: Issues and Policy Models for Faculty Ownership

Domain 2 : Teaching, Learning, and Technology: An Emerging and Contextual Faculty Support Model

Domain 3 : MIS Finance and Budgeting Issues in Small Public and Private Institutions

Domain 4 : Streamlining the Admissions Process with Imaging and Workflow

Domain 5 : Early Adopters Report: The Complex Schools

Domain 5 : Early Adopters Report: The Coordinated Schools

Domain 6 : The Digital Divide: A Country Western Technology Song

Domain 3 : UCITA: Enforceability and Fairness of Negotiated, Shrinkwrap, and Click-Through Licenses

Domain 5 : Developing and Implementing a Community College Technology Plan: An Annual Process

Domain 6 : Portals: A Framework for Customer Centered Resources

	Corporate Presentation : Datatel, Inc. - Practical Solutions for Joining the "Webolution" -Presented by: Team Datatel
	Corporate Presentation : KPMG, LLP - Portals: The Power of Internet Standards in Higher Education
	Corporate Workshop : Apple Computer, Inc. - Building the Future: Tools for Higher Education in Mac OS X & Beyond
	Corporate Workshop : Blackboard, Inc. - Building Courses in Blackboard 5 *Hardware provided by Dell.*
	Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Collaborating with others using Exchange 2000 and Exchange 2000 Conferencing Server
	Corporate Workshop : Oracle Corporation - E-Solutions and CRM (Constituent Relationship Manager) for Higher Ed
	Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting
	Corporate Workshop : Sun Microsystems, Inc. - The Education Portal
2:15 p.m. - 3:25 p.m.	**Domain 2** : Five Robust Implementations of Course Management Systems, Part 1
3:00 p.m. - 3:45 p.m.	Refreshment Break in the Exhibit Hall - sponsored by AppliedTheory Corporation
3:45 p.m. - 4:30 p.m.	**Domain 1** : Fair Allocation of Scarce Resources: Policies and Tools
	Domain 1 : Innovations in Student Service: Models for the E-Revolution
	Domain 1 : The IMS Specifications: A Status Report
	Domain 2 : Early Followers versus Early Adopters: The Use of Technology as a Change Lever Leads to Increased Learning and Decreased Costs in a Computer Fluency Course
	Domain 2 : Five Robust Implementations of Course Management Systems, Part 2
	Domain 2 : From Place to Space: Perspectives on Web Course Management Software Support
	Domain 2 : Measuring the Effectiveness of Distance Education
	Domain 3 : Beyond Access Management: The Roles of Authentication and PKI in Information Retrieval and Management

	Domain 3 : ERP Implementation on a Limited Budget: Maximizing Student Resources for Success
	Domain 4 : How Do You Get Started Building a University Web Portal?
	Domain 5 : Digital Subscriber Line Services
	Domain 5 : Wireless Laptops for the Library and the Portable Classroom
	Domain 6 : Integrating Information, Education, and Technology Services
	EDUCAUSE Domain : 2000 Annual Gartner-EDUCAUSE Update
	Corporate Presentation : Sallie Mae Solutions/Exeter Educational Management Systems, Inc. - There's No Business Like E-Business--And It's Your Business To Know
	Corporate Presentation : Sun Microsystems, Inc. - The Net Effect on Education
	Corporate Workshop : Apple Computer, Inc. - Wireless Unplugged: An Introduction to Apple's AirPort and Wireless Networking
	Corporate Workshop : Blackboard, Inc. - Creating Assessments *Hardware provided by Dell.*
	Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Creating and Managing Learning Content with LRN
	Corporate Workshop : Oracle Corporation - Oracle Grants Proposal: Making Proposal Creation and Submission Easy!
	Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting
	Corporate Workshop : Sun Microsystems, Inc. -Java™ in Education Workshop
4:00 p.m. - 4:45 p.m.	**Meeting** : EDUCAUSE Institute Leadership Program Faculty
	Meeting : EDUCAUSE Institute Management Program Faculty
4:00 p.m. - 7:00 p.m.	**Meeting** : Pinnacle/SCT-IDMS CIO
4:45 p.m. - 5:30 p.m.	**Meeting** : CNI Organizational Update
	Meeting : CREN Organizational Update
4:45 p.m. - 6:00 p.m.	**Meeting** : Evolving Technologies Committee

Meeting : Frye Institute Organizational Update

Meeting : NLII READI Project Update

Meeting : TLT Organizational Update

Poster Session - Information Systems : Building an Inter-Institutional Student Information System: A New Model

Poster Session - Information Systems : Evaluating the Success of Administrative Systems Implementations

Poster Session - Information Systems : Facing ERP Challenges

Poster Session - Information Systems : Star Schema vs EIS

Poster Session - Information Systems : Utilizing Current System Investment while Web-Enabling Applications

Poster Session - Infrastructure & Basic Services : Be SENSORtive: Building a Budget-Friendly Intrusion Detection System

Poster Session - Infrastructure & Basic Services : Guerrilla Tactics in Meeting the Challenge of Technological Diversity and Rapid Evolution

Poster Session - Infrastructure & Basic Services : Knowledgebase Integration with a 24-Hour Help Desk

Poster Session - Infrastructure & Basic Services : Passwords Are Like Underwear...An Educational Campaign

Poster Session - Managing IT : A Simple Guide to Understanding University e-Business

Poster Session - Managing IT : Advising Deans and Directors on Planning for a Web Presence: A Case Study

Poster Session - Managing IT : Building a New Server Support Team after Reorganization

Poster Session - Managing IT : Implementing Ubiquitous Computing at Seton Hall University: A Case Study

Poster Session - Managing IT : Integrating IT Strategic Planning with Enterprise Project Implementations

Poster Session - Managing IT : Lifelong Learning Portals: Reshaping Academic Computer Laboratories in Higher Education

Poster Session - Managing IT : Making the Most of IT Investments:Project Portfolio Management

Poster Session - Managing IT : Students Empowering Teachers In Technology-Unlimited Possibilities (SET IT UP!)

Poster Session - Managing IT : Western Iowa Tech's Attempt to Remove Oxymoron From Information Technologies and Customer Service

Poster Session - New Technologies : Digital Imaging with Web-based Retrieval and Security

Poster Session - New Technologies : From the Quill to the Query: Electronic Threads in the Journal Editor's Bag

Poster Session - New Technologies : Improving the Quality and Efficiency of Student Services Through Web-Interfaced Databases

Poster Session - New Technologies : Promising Practices in Computer/Student Cooperation: Using Student Metacognitive Judgments to Improve Learning in CAI

Poster Session - Signature Sessions : Asynchronous Learning from the Student Perspective

Poster Session - Signature Sessions : Convergence, Collisions, and Creative Change at the UCSF Library

Poster Session - Signature Sessions : Creating a Learning-Teaching Center: The Convergence of Faculty Development, Technology & Student Enterprises

Poster Session - Signature Sessions : Getting Beyond the Buzz Words: Using Technology to Make Museums More Accessible to Audiences

Poster Session - Signature Sessions : Intercultural Internet Information for Tri-Cities All-American City Award

Poster Session - Signature Sessions : Joined up People... Joined up Computing: An Implementation of TLT group's roundtable methodology and flashlight program in the United Kingdom

Poster Session - Signature Sessions : Navigating Scholarship and Supporting Learning with Discipline-Based Web Gateways

Poster Session - Signature Sessions : Preparing Freshmen to Participate in the Mobile Classroom

Poster Session - Signature Sessions : The Virtual Design Studio and the Virtual Term Abroad

Poster Session - Signature Sessions : Writing for EDUCAUSE Quarterly

Poster Session - Teaching & Learning : Coping with Success: Scaling an IMS in a Large Institution

Poster Session - Teaching & Learning : Distance Education: Does the Medium Fit the Method?

Poster Session - Teaching & Learning : Free Portal and Course Management Software; Building Collaboration to Develop a New e-Learning Environment

Poster Session - Teaching & Learning : I Wanna Hold Your Hand: Undergraduate Online Instruction using CourseInfo

Poster Session - Teaching & Learning : Next Steps: Beyond the Walls of the University

Poster Session - Teaching & Learning : Online Modules: A New Curriculum Delivery Model

Poster Session - Teaching & Learning : Social Science Laboratories via the Web

Poster Session - Teaching & Learning : Soothing the Specter of Statistical Support for the Social Sciences

Poster Session - Teaching & Learning : Student Learning Portals: Looking Beyond Faculty and Department Web Sites

Poster Session - Teaching & Learning : Taking Stock: The VCU Images Collection

Poster Session - Teaching & Learning : Web-Based BackPacks, Portfolios, Toolboxes: A Framework for Professional Development

Poster Session - Teaching & Learning : An Analysis of Learning Styles in Face-to-Face and Distance Education Learners

Constituent Group : Data Administration (Follow-up)

Constituent Group : Gartner Group Issues

Constituent Group : Network Improvement

Constituent Group : Small Colleges (under 5,000 FTE) (First Session)

Constituent Group : Users of PeopleSoft Applications (New and Prospective Users)

Current Issues Roundtable : Advanced Networking: How Much is Enough?

Current Issues Roundtable : Copyright Infringement Issues

Current Issues Roundtable : Digital Libraries: Progress and Challenges

	Current Issues Roundtable : Electronic Classrooms and Buildings of the Future
	Current Issues Roundtable : Electronic Learning Environments: Assessing Educational Outcomes
	Current Issues Roundtable : Engaging and Supporting Faculty Use of Technology: From Boutique to Mainstream
	Current Issues Roundtable : Enterprise Information Portals
	Current Issues Roundtable : From Web Site to Portal: Technical Challenges
	Current Issues Roundtable : Wireless Networking: What Role Will It Play in Your Campus's Future?
5:00 p.m. - 6:00 p.m.	**Meeting** : Institute Alumni Reception
5:15 p.m. - 6:15 p.m.	**Meeting** : Corporate Reception (by invitation only)
6:00 p.m. - 7:00 p.m.	**Meeting** : EDUCAUSE System Security Task Force
7:00 p.m. - 9:00 p.m.	**Meeting** : Broadband Wireless

Thursday, October 12

7:00 a.m. - 8:00 a.m.	**Meeting** : Java Sig
	Meeting : Breakfast for Thursday Speakers, Conveners, and Domain Coordinators
	Meeting : Recognition Breakfast - by invitation only
7:00 a.m. - 9:00 a.m.	**Meeting** : Net@EDU VoIP Working Group Breakfast - by invitation only
7:00 a.m. - 4:00 p.m.	Speaker Staging Room Open
7:00 a.m. - 6:00 p.m.	Registration Desk Open
8:15 a.m. - 9:00 a.m.	**Corporate Presentation** : Microsoft Corporation - Empowering Education through Collaborative Learning Technologies
	Corporate Workshop : Apple Computer, Inc. - Streaming Your Stuff: How to Set Up QuickTime Streaming Content Simply and Painlessly
	Corporate Workshop : Blackboard, Inc. - Collaborative Learning *Hardware provided by Dell.*
	Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Creating and Managing Learning Content with LRN

Corporate Workshop : Oracle Corporation - Building a Website with Oracle Portal

Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting

Corporate Workshop : Sun Microsystems, Inc. - Grid Computing Workshop

Domain 1 : 24/7 Centralized or Decentralized: A System Approach

Domain 1 : Building Alliances with Private Industry

Domain 2 : PATRON: Using a Multimedia Digital Library for Learning and Teaching in the Performing Arts

Domain 2 : Virginia Tech's Distance and Distributed Learning (DDL) Fast Track Project

Domain 3 : Addressing Institutional Culture and Change Issues

Domain 3 : Enterprise Resource Planning (ERP) at the University of Nebraska: Defining Roles

Domain 4 : Administrative Systems as Instantiations of University Policy

Domain 4 : Ubiquitous Access: Implementing Web-Based File Storage, Collaboration and Sharing on Campus

Domain 5 : Federal and State PKI Bridge Evolution: Cutting Across Stovepipes

Domain 5 : Wireless Andrew: An Update on Lessons Learned

Domain 6 : Partnering in the Learning Marketspace

Domain 3 : A Conceptual Framework for Decision-Making about Distributed Learning

Domain 3 : On the Future of Libraries in the Digital Revolution

EDUCAUSE Domain : Gaining Access to Affordable Broadband Connectivity: Strategies for Connecting to Existing and Future Networks

Corporate Presentation : eCollege.com - The Evolution of Learning

9:00 a.m. - 9:45 a.m. Refreshment Break - sponsored by Avaya

9:45 a.m. - 11:15 a.m. **General Session** : Judith Estrin, Chief Executive Officer of Packet Design, Inc. sponsored by ABT, Inc. The Technological Future of the Internet

11:00 a.m. - 4:00 p.m.	Exhibit Hall Open
11:15 a.m. - 11:45 a.m.	Refreshment Break in the Exhibit Hall
11:30 a.m. - 1:30 p.m.	**Meeting** : IEEAF
11:45 a.m. - 12:30 p.m.	**Corporate Workshop** : Apple Computer, Inc. - Mac OS X
	Corporate Workshop : Blackboard, Inc. - Building Courses in Blackboard 5 *Hardware provided by Dell.*
	Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Collaborating with others using Exchange 2000 and Exchange 2000 Conferencing Server
	Corporate Workshop : Oracle Corporation - Oracle Internet Procurement
	Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting
	Corporate Workshop : Sun Microsystems, Inc. - Building a Digital Library
	Domain 1 : Network Game Show
	Domain 1 : The Ohio Video Intranet: A Consortial Model of Statewide Infrastructure Development
	Domain 2 : Faculty/Student Interaction at a Distance: Seeking Balance
	Domain 2 : Managed Chaos: Learning in Technology Enhanced Environments
	Domain 3 : The Creation, Care, and Feeding of a Knowledge Base: Practical Advice
	Domain 3 : What Do We Really Understand about the Cost of IT Support Services?
	Domain 4 : Internal Outsourcing: Leverage Resources and Maintain Control
	Domain 4 : It Takes a Village to Raise an Integrated System: Collaboration Within and Beyond the Institution
	Domain 5 : Digital Video: The Killer App for Internet2?
	Domain 5 : Wireless Technology in the Library: The RIT Experience
	Domain 6 : Bridging the Digital Divide in Higher Education
	Domain 5 : Five Minutes of Fame: Collaboration Is Key

	EDUCAUSE Domain : Campus Computing 2000: The National Survey of Information Technology in U.S. Higher Education
	EDUCAUSE Domain : The Networked Environment at Wake Forest University
	Corporate Presentation : Compaq Computer Corporation - Managing Security in the Fast Moving e-University Environment
	Corporate Presentation : Oracle Corporation - Critical Considerations in Building e-Academia Systems
12:00 p.m. - 1:00 p.m.	**Meeting** : E2000/2001 Program Committee
12:30 p.m. - 2:00 p.m.	**Meeting** : NCURA
12:30 p.m. - 2:15 p.m.	Birds of a Feather
	Lunch in the Exhibit Hall
12:45 p.m. - 2:15 p.m.	**Constituent Group** : Chief Information Officers (Follow-up)
	Constituent Group : Community Colleges
	Constituent Group : Electronic Records Management
	Constituent Group : Intranet Applications
	Constituent Group : Multimedia
	Constituent Group : Project Management
	Constituent Group : Teaching and Learning
	Constituent Group : Small Colleges Follow-up Session (under 5,000 FTE)
	Constituent Group : Web Administrators
1:00 p.m. - 3:00 p.m.	**Meeting** : SAC Board
1:00 p.m. - 4:00 p.m.	**Meeting** : E2001 Program Committee
2:15 p.m. - 3:00 p.m.	**Corporate Workshop** : Blackboard, Inc. - Blackboard 5 Administration Demonstration - DEMO ONLY *Hardware provided by Dell.*
	Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Creating Educational Workspaces using Digital Dashboards
	Corporate Workshop : Oracle Corporation - E-Solutions and CRM (Constituent Relationship Manager) for Higher Ed
	Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting

	Corporate Workshop : Sun Microsystems, Inc. - Education Portal Workshop
	Domain 1 : Making Your Online Learning Environment a Success
	Domain 1 : One Size Does Not Fit All: Models for Support and Training Partnerships in Virginia
	Domain 2 : Faculty Development: Successes and Lessons Learned from Pittsburgh, Florida, Virginia Tech, and Wake Forest
	Domain 2 : MERLOT: A National Teaching and Learning Network for Faculty
	Domain 2 : Using Web-Based Learning to Improve Instruction and Reduce Costs
	Domain 3 : Outsourcing IT: What We Have Learned the Hard Way
	Domain 3 : The Full Monty: Two Mutually Incompatible Views of Organizational Convergence
	Domain 4 : Leveraging Our Information Assets for Electronic Communication
	Domain 5 : High Quality Internet Video Conferencing is Here Now!
	Domain 5 : Technology Abuse Incident Tracking at Indiana University
	Domain 6 : Crossing the James: A Model for Distributed Learning in the Virginia Community College System
	Domain 3 : E-Rewards: 10 Strategies for Recruiting and Retaining IT Employees
	EDUCAUSE Domain : Emerging Information Resources for Scholars
	EDUCAUSE Domain : University of Washington: Technology Serving Teaching and Learning
	Corporate Presentation : Apple Computer, Inc. - The Latest from Apple: Desktop Movies with iMovie 2 and Mac OS X
	Corporate Presentation : Toshiba America Computer Systems Division - Toshiba Turns The Tables: We Want To Hear From You!
3:00 p.m. - 3:45 p.m.	Refreshment Break in the Exhibit Hall - sponsored by HigherMarkets
	Meeting : NWACC Board/Program Committee
3:45 p.m. - 4:30 p.m.	**Corporate Workshop** : Apple Computer, Inc. - Apple

[redacted]

Learning Series: Tools and Staff Development for Faculty

Corporate Workshop : Blackboard, Inc. - Building Courses in Blackboard 5
Hardware provided by Dell.

Corporate Workshop : Microsoft Corporation and Compaq Computer Corporation - Creating Rich Streaming Media Content

Corporate Workshop : Oracle Corporation - Oracle Grants Proposal: Making Proposal Creation and Submission Easy!

Corporate Workshop : PeopleSoft, Inc. - Operational Data Store: Redefining ERP Operational Reporting

Corporate Workshop : Sun Microsystems, Inc. - Java™ in Education Workshop

Domain 1 : Integrating Digital Technology for Communication

Domain 2 : A Catalyst for Collaboration: Supporting Technology in Teaching through Partnerships

Domain 2 : The Cultural Impact of Enterprise Course Management Systems

Domain 3 : By Tomorrow, Today's IT Headlines Will Be Yesterday's News

Domain 3 : Strategic Planning for IT: Lessons Learned

Domain 4 : MyUMBC: Lessons Learned in Developing a Campus Web Portal

Domain 5 : Now That We've Wired Everything, You Want to Connect Where? A Wireless Pilot Story

Domain 5 : Virtual Rounds: H.323 Videoconferencing in Veterinary Medical Education

Domain 6 : Open Access to Campus Networks by Public Utility Companies: Case Study

Domain 1 : AN-MSI: An NSF-Sponsored Collaborative Project for Better Networking

Domain 2 : ICDE, the Global Organization for Distance Learning: Presenting Three Successful Leading Edge University Models for Distance and Web-Based Learning

EDUCAUSE Domain : Leading the Profession: Winners of the 2000 EDUCAUSE Special-Focus Leadership Awards

Corporate Presentation : Blackboard, Inc. - Blackboard 5

Corporate Presentation : SAP Public Sector and Education - ERP Implementations: A Dialogue

4:00 p.m. - 6:00 p.m. **Meeting** : CREN TechTalk

4:45 p.m. - 6:00 p.m. **Meeting** : ICDE Follow-up Session

Current Issues Roundtable : E-Business: Is It Any Less Complex in a Small College?

Current Issues Roundtable : Distance Education: How Do You Know It's Right for Your Campus?

Current Issues Roundtable : From Web Site to Portal: Organizational Challenges

Current Issues Roundtable : Funding IT: When Does Outsourcing Make Sense?

Current Issues Roundtable : E-Business: Challenges in the Research University

Current Issues Roundtable : Effective IT Support: It Starts with Understanding Customer Needs

Current Issues Roundtable : Recruiting and Retaining IT Staff: The Crisis Continues ... Or Does It?

Current Issues Roundtable : ERP Systems: Reality Bites

Current Issues Roundtable : Desktop Computing Management: Do We Need to Be Thinner?

Current Issues Roundtable : IT Strategic Planning: Getting It Right

Constituent Group : Network Management

Constituent Group : Policy Issues

Constituent Group : Decision Support/ Data Warehousing (Follow-up Session)

Poster Session - Awards : Hoyasonline: Online Community for Georgetown University Alumni

Poster Session - Awards : Personal Access Web Services (PAWS): A Model Environment for Delivering Individualized, Secure University Services

Poster Session - Awards : Seton Hall University's Teaching, Learning, and Technology Initiatives

Poster Session - Awards : The Catalyst Project: Supporting Faculty Uses of the Web...with the Web

Poster Session - Awards : University of Northern Iowa: Innovative Uses of Networked Technology

Poster Session - Awards : University of Technology, Sydney: Serving the Teaching and Learning Needs of a Diverse Student Body

Poster Session - Information Systems : Applying Process Analysis and Prototype Techniques to Developing Media Services Software

Poster Session - Information Systems : Commercial Internet Portals: Campus Pipeline Profile

Poster Session - Information Systems : Datawarehouse and Beyond

Poster Session - Information Systems : From A Paper Trail To A Vapor Trail: Document Imaging and Workflow

Poster Session - Information Systems : Infonet: Wrapping Your Legacy Systems with New Technology

Poster Session - Information Systems : Providing Research and Development Services Using Intelligent Agents or Artificial Intelligence

Poster Session - Infrastructure & Basic Services : Building and Maintaining a Scaleable Electronic Mail Infrastructure

Poster Session - Infrastructure & Basic Services : Delivering Effective Information: Writing It to Web-ing It

Poster Session - Infrastructure & Basic Services : Distance Training for Surgeons: Approaches for Effective Learning

Poster Session - Infrastructure & Basic Services : Electronic Communications Myth/Reality Campaign

Poster Session - Managing IT : Connecting the White Space between Strategic Consultants, their Clients and their Organizations Using the Web

Poster Session - Managing IT : Desktop Computer Acquisition: Standards, Funding and Vendor Partnerships

Poster Session - Managing IT : Knowing When to Get Out of the Business: Phasing Out Remote Access Services

Poster Session - Managing IT : Recruiting, Training and Retaining a Student IT Staff

Poster Session - Managing IT : Student Technology Fellows: A Reverse Generation Mentoring Model for Effective Faculty Development

Poster Session - Managing IT : Transforming IT at McGill University: Managing Change

[redacted]

Poster Session - Managing IT : Use Yours Peers! Successful Network Consulting

Poster Session - Managing IT : VITAL: The Virtual Instructional Team for the Advancement of Learning

Poster Session - New Technologies : Curriculum Development for Conversion to Online Delivery

Poster Session - New Technologies : Cyber-Active Learning: An Online Success Story

Poster Session - New Technologies : Online Education: A Realistic Perspective of Issues, Challenges and Successes

Poster Session - New Technologies : Streaming Media

Poster Session - New Technologies : Transforming Academic Programs Through Technology: Lessons Learned

Poster Session - Signature Sessions : Building a Campus Portal in Nine Months: Did the Team Live or Die?

Poster Session - Signature Sessions : Creating Dartmouth's Jones Media Center: From Concept to Vision to Implementation

Poster Session - Signature Sessions : Library Services for Florida's Distance Learners

Poster Session - Signature Sessions : MyUB Personalizes the University at Buffalo

Poster Session - Signature Sessions : The Student on the Stage: Student Created Music Projects for the Web

Poster Session - Signature Sessions : Transforming an Institution with the Information Technology Strategic Plan

Poster Session - Signature Sessions : Virtual Collegiality: Academic Community and Computer-Mediated Communication

Poster Session - Signature Sessions : Writing for EDUCAUSE Quarterly

Poster Session - Teaching & Learning : Access and Interaction in a Broadband Online Learning Environment

Poster Session - Teaching & Learning : Bigger Can Be Better!

Poster Session - Teaching & Learning : Content-Driven Approaches To Distributed Learning

Poster Session - Teaching & Learning : Integrating Color Effectively for Instructional Images

Poster Session - Teaching & Learning : Multimedia and Education: An Integrated Approach

Poster Session - Teaching & Learning : Preparing Future Teachers to Use Internet Technologies

Poster Session - Teaching & Learning : Reengineering a Course for Online Delivery

Poster Session - Teaching & Learning : The Internet Imaging System: Sharing Knowledge with Digital Images

Poster Session - Teaching & Learning : The University of Iowa Science Information Literacy Initiative

Poster Session - Teaching & Learning : UTWired: A Dynamic Portal for Learning and Ideas

Meeting : Internet2 Organizational Update

Meeting : NLII Organizational Update

Meeting : Net@EDU Organizational Update

7:00 p.m. - 11:00 p.m. Roundup at the Wildhorse Saloon - sponsored by Microsoft Corporation and PeopleSoft, Inc.

Friday, October 13

7:00 a.m. - 8:00 a.m. **Meeting** : EDUCAUSE Annual Business Meeting

Meeting : Breakfast for Friday Speakers, Conveners, and Domain Coordinators

7:00 a.m. - 12:00 p.m. Registration Desk Open

8:15 a.m. - 9:00 a.m. **EDUCAUSE Domain** : EDUCAUSE Policy Issues

Domain 1 : Centralized Directory Services and Accounts Management

Domain 1 : IT Asset Management: What Computer Equipment Do You Own and Where Is It?

Domain 2 : Digital Rights Management in E-Learning: A Case Study

Domain 2 : Evaluation of Scalable Applications of Information Technology to On-Campus Learning

Domain 2 : The Revolution Will Not Be Digitized: Campaign Strategies for Sustainable Faculty Development and Instructional Innovation

Domain 2 : Who Is the Online Student?

Domain 3 : If the Shoe Fits: Integrating New Electronic Resources into the Academy and the Library

Domain 4 : A User-Centered Approach to Student Information Systems Design

Domain 5 : Getting the FACTS in Florida

Domain 6 : Smart Tools Academy: A Statewide Technology Training Effort for K-12 School Leaders

Domain 6 : Using Educational Technology to Promote Cultural Diversity, Teaching, Mentoring, and Collaboration

Domain 3 : IT Recruiting: Great Candidates CAN Be Found!

Domain 5 : Moving Faculty to Web-Based Assessment: It's a Question of Perception

Corporate Presentation : 3Com Corporation - Wireless Networking in Education

Corporate Presentation : PricewaterhouseCoopers LLP - E-Business and Portals in Higher Education: Implications for Process, Service, and Structure

9:00 a.m. - 9:15 a.m. Break

9:30 a.m. - 10:15 a.m. **Corporate Presentation** : Cisco Systems, Inc.

Domain 1 : A Real Life Approach To Policy

Domain 2 : Beyond Early Adopter to Full Integration of Technology in the Curriculum

Domain 2 : Making the Transition: Helping Faculty to Teach Online

Domain 2 : Technology, Teamwork, and Teaching Meet in the Classroom

Domain 4 : Setting the Standard: BC's Post-Secondary Data Definitions and Standards Project

Domain 5 : Digital Video: From the Desktop to Antarctica

Domain 5 : How Evolving Technologies Will Impact Higher Education

Domain 5 : Voice over IP: How Is It Playing in Higher Education?

Domain 6 : Southeastern Native American Documents, 1763-1842

[redacted]

Domain 6 : University of California, Merced: A New Research University Model in a New Place

Corporate Presentation : Gateway - Mobile and Wireless Strategies for College Campuses

10:30 a.m. - 11:30 a.m. **General Session** : David Halberstam, Author - Sponsored by NEC America, Inc.
America: Then and Now

EDUCAUSE 2000 PROCEEDINGS

EDUCAUSE 2000 HOMEPAGE

EDUCAUSE 2000 October 10-13
PROGRAM • REGISTRATION • CORPORATE PARTICIPATION • HOTEL & TRAVEL Nashville

Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Conference Sessions

The following sessions were held at EDUCAUSE 2000. Those with hyperlinks have post-conference information associated with them. The information may include written papers, audio, or PowerPoint presentations.

Domain 1: Infrastructure and Basic Services

- 24/7 Centralized or Decentralized: A System Approach
- A Real Life Approach To Policy
- AN-MSI: An NSF-Sponsored Collaborative Project for Better Networking
- Building Alliances with Private Industry
- Centralized Directory Services and Accounts Management
- Equipping Faculty for Success with Technology
- Fair Allocation of Scarce Resources: Policies and Tools
- From Genesis to Infinity: Zero to 50,000 Online Students in Two Years
- Innovations in Student Service: Models for the E-Revolution
- Integrating Digital Technology for Communication
- Interactive Distance Learning without Barriers
- IT Asset Management: What Computer Equipment Do You Own and Where Is It?
- Learning Village: Connecting Homes, Campuses, and People
- Leveraging Your State Universities' Software Licensing to the Max: Opportunities, Benefits and Retrospective Review
- Making Your Online Learning Environment a Success
- Network Game Show
- One Size Does Not Fit All: Models for Support and Training Partnerships in Virginia
- Planning, Implementing, Supporting, and Assessing a Computer Ownership Policy for Students
- The IMS Specifications: A Status Report
- The Ohio Video Intranet: A Consortial Model of Statewide Infrastructure Development

Domain 2: Teaching and Learning

- A Catalyst for Collaboration: Supporting Technology in Teaching through Partnerships
- Beyond Early Adopter to Full Integration of Technology in the Curriculum
- Beyond Gravity
- Blackboard and PeopleSoft Integration: Lessons from the Front Lines
- Courseware Development for Distance Education: Issues and Policy Models for Faculty Ownership
- Digital Rights Management in E-Learning: A Case Study
- Early Followers versus Early Adopters: The Use of Technology as a Change Lever Leads to Increased Learning and Decreased Costs in a Computer Fluency Course
- Evaluation of Scalable Applications of Information Technology to On-Campus Learning
- Exchanging Messages or Meeting Minds?
- Faculty Development: Successes and Lessons Learned from Pittsburgh, Florida, Virginia Tech, and Wake Forest
- Faculty/Student Interaction at a Distance: Seeking Balance
- Five Robust Implementations of Course Management Systems, Part 1
- Five Robust Implementations of Course Management Systems, Part 2
- From Place to Space: Perspectives on Web Course

Management Software Support
- I Can't Define a Great Online Course but I Know When I See One: Lessons To Date
- ICDE, the Global Organization for Distance Learning: Presenting Three Successful Leading Edge University Models for Distance and Web-Based Learning
- Making the Transition: Helping Faculty to Teach Online
- Managed Chaos: Learning in Technology Enhanced Environments
- Measuring the Effectiveness of Distance Education
- MERLOT: A National Teaching and Learning Network for Faculty
- PATRON: Using a Multimedia Digital Library for Learning and Teaching in the Performing Arts
- Teaching, Learning, and Technology: An Emerging and Contextual Faculty Support Model
- Technology, Teamwork, and Teaching Meet in the Classroom
- The Cultural Impact of Enterprise Course Management Systems
- The Revolution Will Not Be Digitized: Campaign Strategies for Sustainable Faculty Development and Instructional Innovation
- Using Web-Based Learning to Improve Instruction and Reduce Costs
- Venturing Online: Developing and Implementing an E-Learning Strategy
- Virginia Tech's Distance and Distributed Learning (DDL) Fast Track Project
- What It Takes: New Roles, Competencies and Models for Implementing Online Distance Education
- Who Is the Online Student?

Domain 3: Managing Information Technologies and Resources

- E-Rewards: 10 Strategies for Recruiting and Retaining IT Employees
- A Conceptual Framework for Decision-Making about Distributed Learning
- Addressing Institutional Culture and Change Issues
- Beyond Access Management: The Roles of Authentication and PKI in Information Retrieval and Management
- By Tomorrow, Today's IT Headlines Will Be Yesterday's News
- Council on Library and Information Resources
- Distance Education as a Business within a University
- Enterprise Resource Planning (ERP) at the University of Nebraska: Defining Roles
- ERP Implementation on a Limited Budget: Maximizing Student Resources for Success
- If the Shoe Fits: Integrating New Electronic Resources into the Academy and the Library
- IT Recruiting: Great Candidates CAN Be Found!
- MIS Finance and Budgeting Issues in Small Public and Private Institutions
- New Beginnings II: The Realities of a New Senior Level IT Position
- On the Future of Libraries in the Digital Revolution
- Outsourcing IT: What We Have Learned the Hard Way
- Strategic Planning for IT: Lessons Learned
- The Creation, Care, and Feeding of a Knowledge Base: Practical Advice
- The Full Monty: Two Mutually Incompatible Views of Organizational Convergence
- UCITA: Enforceability and Fairness of Negotiated, Shrinkwrap, and Click-Through Licenses
- What Do We Really Understand about the Cost of IT Support Services?

Domain 4: Information Systems

- A User-Centered Approach to Student Information Systems Design
- Administrative Systems as Instantiations of University Policy

- Building Whistler City: Distributed Web Registration for PeopleSoft Using IBM WebSphere on Linux
- Data Models for a Registrar's Data Mart
- E-Commerce@MIT
- Experiences Integrating B2B E-Commerce with Campus Information Systems
- Higher Education ERP: Lessons Learned
- How Do You Get Started Building a University Web Portal?
- Internal Outsourcing: Leverage Resources and Maintain Control
- It Takes a Village to Raise an Integrated System: Collaboration Within and Beyond the Institution
- Leveraging Our Information Assets for Electronic Communication
- MyUMBC: Lessons Learned in Developing a Campus Web Portal
- Setting the Standard: BC's Post-Secondary Data Definitions and Standards Project
- Streamlining the Admissions Process with Imaging and Workflow
- Ubiquitous Access: Implementing Web-Based File Storage, Collaboration and Sharing on Campus

Domain 5: New Technologies: New Capabilities, New Opportunities

- Developing and Implementing a Community College Technology Plan: An Annual Process
- Digital Subscriber Line Services
- Digital Video: From the Desktop to Antarctica
- Digital Video: The Killer App for Internet2?
- Early Adopters Report: The Complex Schools
- Early Adopters Report: The Coordinated Schools
- Federal and State PKI Bridge Evolution: Cutting Across Stovepipes
- Five Minutes of Fame: Collaboration Is Key
- Getting the FACTS in Florida
- High Quality Internet Video Conferencing is Here Now!
- How Evolving Technologies Will Impact Higher Education
- Java Pays: Delivering a Mission-Critical Enterprise Time Collection System that Works
- Media-Rich Learning through Universal Computing and Wireless Thin Client
- Moving Faculty to Web-Based Assessment: It's a Question of Perception
- Now That We've Wired Everything, You Want to Connect Where? A Wireless Pilot Story
- Public Key Infrastructure
- Reaping the Benefits from a Campus ATM Converged Network
- Technology Abuse Incident Tracking at Indiana University
- Virtual Rounds: H.323 Videoconferencing in Veterinary Medical Education
- Voice over IP: How Is It Playing in Higher Education?
- Wireless Andrew: An Update on Lessons Learned
- Wireless Laptops for the Library and the Portable Classroom
- Wireless Technology in the Library: The RIT Experience

Domain 6: Signature Sessions: Patterns of Converging and Emerging

- Access and Innovation: Partnering to Train Professional Workforce Educators
- Bridging the Digital Divide in Higher Education
- Consortial IT Services: Collaborating to Reduce the Pain
- Crossing the James: A Model for Distributed Learning in the Virginia Community College System
- E-Business: A Vision and Strategy for the University of Minnesota
- Integrating Information, Education, and Technology Services
- Open Access to Campus Networks by Public Utility Companies: Case Study
- Partnering in the Learning Marketspace
- Portals: A Framework for Customer Centered Resources

- Portals: Business, Student Information, and Learning Drivers
- Smart Tools Academy: A Statewide Technology Training Effort for K-12 School Leaders
- Southeastern Native American Documents, 1763-1842
- The Digital Divide: A Country Western Technology Song
- The Three Sisters of Kentucky: A Virtual Triad of Excellence and Possibilities
- University of California, Merced: A New Research University Model in a New Place
- Using Educational Technology to Promote Cultural Diversity, Teaching, Mentoring, and Collaboration
- Who's Who, Who Isn't, What They Can Do, and How

EDUCAUSE Track

- 2000 Annual Gartner-EDUCAUSE Update
- Campus Computing 2000: The National Survey of Information Technology in U.S. Higher Education
- EDUCAUSE Policy Issues
- Emerging Information Resources for Scholars
- Gaining Access to Affordable Broadband Connectivity: Strategies for Connecting to Existing and Future Networks
- Leading the Profession: Winners of the 2000 EDUCAUSE Special-Focus Leadership Awards
- The EDUCAUSE Task Force on System Security: Initial Focus and Opportunities for Participation
- The Networked Environment at Wake Forest University
- University of Washington: Technology Serving Teaching and Learning

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EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0059
Title:	AN-MSI: An NSF-Sponsored Collaborative Project for Better Networking
Author:	Dave A. Staudt, Laura-Lee Davidson, Steven Dupuis and Alex Ramirez
Organization:	EDUCAUSE, U of I- Urbana-Champ., Leadership Foundation, Salish Kootenai College and HACU
Year:	2000
Abstract:	Tribal colleges, HBCUs and Hispanic-serving institutions are working together with EDUCAUSE under an NSF award to improve networks and their use at these colleges and universities. Leaders of the three communities will describe the project, the innovative ideas being developed, the progress to date, where we're headed and how others might participate.

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EDUCAUSE **Information Resources Library**

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0038

Title: Building Alliances with Private Industry

Author: Karen DeMauro and Andrew C. Lawlor

Organization: Clarion University of Pennsylvania and Edinboro University of Pennsylvania

Year: 2000

Abstract: Clarion and Edinboro Universities have faced the same dilemma: how to provide Internet access to unwired residence hall rooms with no money or personnel. As this presentation will show, their similar solutions involve merging technology services and entering into a public/private alliance that installs and manages the services while accepting future royalties as payment.

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Building Alliances with Private Industry

Karen DeMauro
Assistant Vice President for
Computing Services
Clarion University of Pennsylvania

Andrew C. Lawlor
Associate Vice President for
Technology and Communications
Edinboro University of Pennsylvania

Clarion University and Edinboro University, both members of the Pennsylvania State System of Higher Education, recently faced a dilemma shared by many other colleges and universities. How do we provide Internet access to unwired residence halls with no money, no additional support personnel and in a timeframe too short to accommodate the standard procurement process for this type of project?

This dilemma forced us to become more creative, giving birth to a unique solution that has now been implemented at both universities. Each institution bundled university related telecommunication services with residence hall services and searched for a vendor consortium to install and manage those services. In return for a long-term contract granting the right to sell services to students, their parents, faculty, staff and other affinity groups of the university, the consortium agreed to invest $1.5m to install a data network in the residence halls.

The student services offered through the two alliances include student long distance, voice mail, caller ID, cable television, Internet access, an on-campus computer store/help desk, cellular telephone and paging services. Many of these services are also offered to faculty, staff, alumni and other affinity groups of the universities. Administrative services for the universities include new PBXs, local exchange service and long distance service as well as the management of the computer stores, residence hall networks and telephone systems for ten years.

There are a few unique aspects to these two projects. One is the business case in which the vendors accept royalties on anticipated sales to recoup their $1.5 initial investment. Another is the development of consortia lead by Prime Contractors to supply and manage the services and yet a third is the procurement process used in both instances.

The Governor's Office of Information Technology developed a new procurement process called a Request for Qualified Contractor (RFQC) to replace the more rigid Request for Proposal (RFP). Without this new, extremely flexible procurement process these alliances could not have been created. While involving many more steps than an RFP, the RFQC process allowed the universities to cut the overall project timelines by 35% to 50%.

This presentation will cover the technical and financial environments of each university prior to the alliances as well as a brief description of the final solutions. In addition, a description of the new RFQC process and its importance to these projects will be discussed together with lessons learned and issues pertaining to the next phase of the projects, long term management.

Building Alliances with Private Industry

Karen DeMauro
Assistant Vice President for Computing Services
Clarion University of Pennsylvania

Clarion University of Pennsylvania, located in rural, western Pennsylvania, is one of fourteen members of the State System of Higher Education (SSHE). Three years ago the seven residence halls on the Clarion campus were removed from the campus wide network project due to a lack of funding. Since then the University had been seeking alternate solutions that would allow us to install a residence hall network without increasing room rates or assessing a student fee.

Additional concerns surrounding a new residence hall network dealt with support. The University was not in a position to hire additional personnel to support student desktop computers and their connection to a university owned network. Students are a different type of "customer" for Computing Services in that they need support outside of our normal working hours and in peaks, such as opening weekend. Additionally, this would be the first time University employees would be working on non-university owned equipment raising the issue of liability.

Internal changes, such as the transfer of Telecommunications from Facilities' to Computing Services' responsibility, as well as other issues converged to help us design a creative solution. However, since our "solution" had never been implemented before, we had a number of hurdles to overcome before we could begin.

Governor Ridge had been strongly suggesting that the state universities better utilize partnerships with private industry. However, the procurement rules for the SSHE institutions made the development of these partnerships virtually impossible. Clarion worked with the Chancellor's office offering to be the "guinea pig" in the development of a public/private partnership during which we would identify the roadblocks and speed bumps in the existing procedures and, in turn, the Chancellor's Office would try to clear the path for us.

This agreement worked very well resulting in the establishment of a number of SSHE precedents. The first was for the use of the Governor's new Request for Qualified Contractor (RFQC) procurement process. The second was for the development of an alliance consisting of a consortium of vendors to supply services to the university. The consortium is lead by a prime contractor who acts as a single point of contact for the university and is responsible for all services including those supplied by the other consortium members. A third precedent was the establishment of a business case in which the consortium invested heavily in the network installation and agreed to accept the risk of recouping that investment through royalties based on anticipated income over the next ten years.

With the installation of the bulk of the services completed for the Fall 1999 Semester and the installation of the University's PBX's in January and May 2000, Clarion is winding down its implementation phase. Since we still have no precedent to follow, we are now developing methods for the long-term management of this complex project.

Building Alliances with Private Industry

Andrew C. Lawlor
Associate Vice President for Technology and Communications
Edinboro University of Pennsylvania

Edinboro University of Pennsylvania, a state-owned comprehensive university located in the northwest corner of Pennsylvania, is one of fourteen members of the State System of Higher Education (SSHE). When our new president came on board four years ago, he recognized technology as one of the major priorities for the campus. In particular, he felt that colleges and universities were not going to be successful without embracing technology, particularly for students and faculty. With that, we completed a Campus-Wide Information Networks programming document and began the process of a ubiquitous network design for data, voice, and video. As the design neared completion we examined the various means available to wire and provide services to the residence halls in an expeditious manner. It was very important that we do so without extensively raising fees and perhaps pricing ourselves out of the housing market.

We were equally concerned about the support issue. How could we support a large infrastructure in our eight residence halls without significantly expanding staff? Fortunately, at the time we were wrestling with these issues, a sister institution, Clarion University, had the previous year embarked on a plan to wire their halls using a new procurement procedure made available to our State System from the Commonwealth of Pennsylvania. While they were still in the procurement stages of building a public/private alliance, Edinboro University decided to take the same path, and at the same time improving upon Clarion's success.

In following the same path, we too elected to use the Request for Qualified Contractors (RFQC) process, an iterive method that requires consortia of vendors to submit responses to successive publications of our requirements, each time selecting the best ideas of earlier submissions until a "Best and Final" is published and the vendors respond. The result is a business case that demonstrates how royalties and cost avoidance leads to a return on investment. To lead us through this process, Edinboro University hired a consulting firm that has experience in the RFQC process to guide us and assure that, through the negotiation process, our interests were upheld, and that the business case was sound.

By developing a very dedicated cross-divisional team dedicated to the task and keeping the process on the timetable, Edinboro University was able to select and receive approval for the best vendor by June 2000, with installation taking place throughout the summer. Services were marketed extensively to the students through Freshman Orientation and a full color marketing brochure mailed out to all students in July. The response has been extensive.

Three areas of special concern to Edinboro University was to build the business case on conservative subscription rates, spend considerable time and budget on marketing, and to anticipate contract issues with our at-the-time current vendors of services so strategies for avoidance could be considered in advance. While we are still very early in the implementation, we are very pleased with the results of our public/private alliance.

EDUCAUSE Information Resources Library

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0014

Title: Equipping Faculty for Success with Technology

Author: Kathy Gates, John Moore, John Oberlin, Susan Rusiecki, and Tracy Wascom

Organization: The University of Mississippi, Virginia Tech, University of North Carolina, Mount Holyoke College

Year: 2000

Abstract: A key challenge for any university is getting current technology into the hands of faculty and equipping faculty to use that technology. In this session, representatives from four institutions will discuss their programs for the cyclical replacement of faculty desktops and attendant faculty training.

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Equipping Faculty for Success with Technology

Kathy Gates
The University of Mississippi
University, MS

John Moore
Virginia Tech
Blacksburg, VA

John Oberlin
University of North Carolina
Chapel Hill, NC

Susan Rusiecki
Mount Holyoke College
South Hadley, MA

Tracy Wascom
The University of Mississippi
University, MS

A key challenge for any university is getting current technology into the hands of faculty and equipping faculty to use that technology. In this session, representatives from four institutions will discuss their programs for the cyclical replacement of faculty desktops and attendant faculty training.

Equipping Faculty for Success with Technology

This session will focus on programs for the broad-scale, cyclical replacement of faculty desktop computers and attendant training to help faculty best utilize the new technology. Four diverse institutions, Mount Holyoke College, University of Mississippi, University of North Carolina, and Virginia Tech, will present and discuss their solutions.

Issues related to the replacement of faculty desktop computers include application processes, methods for distribution, length of the replacement cycle, funding options, and hardware and software standards, e.g., how much choice should faculty be given in platform selection. Are these programs best handled at the department level or on a university-wide scale? How do these programs fit in with student computer requirements?

While the first step of any successful instructional technology program is to ensure that faculty have access to current hardware and software, the crucial next step is to provide appropriate training so that faculty can become adroit in the use of new technology. What kinds of training programs are most effective? What formats work best? How can the needs of novice computer users be met while still challenging more advanced users? What incentives are provided to ensure faculty participation?

This session targets IT professionals who are charged with implementing quality instructional technology programs. The degree of success that institutions have in meeting these challenges will impact the quality of core teaching and research efforts. The multiple perspectives offered by four diverse institutions are certain to result in valuable and practical insight for all session participants.

Brief statements from each participating institution follow.

Mount Holyoke College

In 1996, Mount Holyoke College administrators made the decision to merge the Library and Computing divisions to create a new division called Library Information and Technology Services (LITS). This merger brought together resources in a way that allowed for new and improved services for faculty, staff and students. Prior to the merger, the provision of desktop computing facilities to faculty and staff had been handled on a smaller scale and a "by request" basis.

One of the first combined endeavors, conducted during the summer of 1997, was to train interested library staff to help with computer upgrades and installations. A three/four year cyclical upgrade program was expanded under the direction of the new position of Coordinator of Computer Installations. In 1999, funding from the college allowed for the installation/upgrade of approximately 220 computers and 30 networked printers. This number increased to over 400 new and recycled computers in 2000. Next year the process will be automated. Using information from the hardware database we plan to project 80% of the needed upgrades. By eliminating the request process for standard upgrades, faculty and administrators will be able to focus on requests for new initiatives.

The LITS Mellon Web Grant has enabled the expanded use of web technology on the Mount Holyoke campus. For the last four years, LITS sponsored web-based curriculum projects (as well as administrative projects), which partnered faculty and students. The grant also supported the training of student web specialists known as "SWEB TECHS". LITS initiated a series of presentations in which faculty could demonstrate their technology projects to one another. Another effective tool has been the Liaison program. Faculty know who their liaisons are and can confer with them about their varied computing needs. All facets of LITS are involved in this endeavor, including Curriculum Support Liaisons and Reference Library Liaisons who assist with pedagogy issues and Technical Support Liaisons who keep faculty computers functioning and current.

In addition to desktop installations, LITS is also charged with upgrading student labs, mediated classrooms and the Faculty Resource Center. The Faculty Resource Center is a high-end computer lab reserved for faculty and staff. Here LITS provides state-of-the-art hardware and software to motivate and support faculty members and staff who have advanced beyond the basics of course/personal web pages. This fall LITS will begin to work with the Dean of Faculty and other advisory groups to develop a classroom strategy which will include a technology upgrade plan for every classroom and computing lab on campus.

Currently, any member of the community can submit requests for hardware upgrades via a web form. They can also check on the current status of approved upgrades and completed installations. We offer a set of guidelines, helpful tips about backing up and tell them what to expect on the installation day. The current forms are at www.mtholyoke.edu/lits/tsr/status/status.html.

The University of Mississippi

In Fall 1999, the University of Mississippi (UM) began a program called TACIT (Technology Acquisition for Curricular and Instructional Technology) to systematically replace faculty desktop computers. Four years ago, UM invested heavily in a program to provide each faculty member with a new computer. While some faculty members had been able to acquire upgrades or replacement systems after that initial acquisition, many were still using these same, now-outdated computers at the start of the 1999 Fall semester. The objective of first year of TACIT was to replace any computers that remained from the previous acquisition.

A team consisting of faculty, IT staff and academic administrators developed an application procedure. (The current form is available as a link from the website, www.olemiss.edu/tacit.) Equipment options included laptop, desktop, PC, Apple, standard and high-end. The age and state of existing faculty computers served as the key factor in determining who would receive new computers. As part of the application process, faculty members were asked to state how they intended to use the new equipment, e.g., Internet, video, statistics. Faculty members who requested laptops rather than desktops were asked to provide a brief justification. Finally, faculty members were asked whether their existing computers could be recycled for others campus uses. For example, a number of older computers have been placed in public areas for student e-mail access.

The faculty members who received new computers were also required to participate in specially-focused, half-day technology workshops. These sessions were presented in a "conference-style" format and attempted to address varying degrees of expertise among faculty. While a small minority of faculty resisted the notion of training, most appreciated the opportunity to learn and improve their skills. Examples of topics covered include "How the Web Can Serve Your Course," "Statistical Packages and Research," and "All About E-mail." Faculty members with exceptional technology skills were asked to help facilitate training for other faculty.

One aspect that will be reworked in this year's implementation is the delivery of the computers. Last year, student workers assisted with delivery, and matching student schedules with faculty schedules proved to be a challenge. This year, the computers will be delivered to departments, and the appropriate property transfers will be made. At a later time, an IT staff member or student worker will return to set up the computer and transfer data from the old system to the new system.

The faculty response to TACIT has been very positive, and university administrators have shown a strong commitment to continuing the program in future years. IT staff are conducting follow-up faculty surveys to further tune TACIT for future implementations. The response thus far indicates that there is much to be gained by centralizing the purchase of desktop computers for faculty and by tieing in the acquisition of new equipment with suitable technology training. See www.olemiss.edu/tacit for more information.

The University of North Carolina

The Carolina Computing Initiative (CCI) is a plan to ensure that students, faculty, and staff have appropriate technology and are able to use it effectively and efficiently in various endeavors. At the center of the initiative is the requirement that, beginning with freshmen in the fall of 2000, undergraduates at UNC-CH own laptop computers that meet university specifications. In addition to the requirement that students own computers, the CCI also ensures that faculty and staff are provided with computer equipment.

The CCI requirement allows faculty to know that all students have access to computers. Professors are more likely to design learning opportunities using computers when they are assured of student participation.

CCI builds upon recent momentum. In 1997 and 1998, Chancellor Michael Hooker provided Instructional Technology Grants to professors proposing innovative ways to use technology in their teaching. Hundreds of Carolina professors participated in Simple Start, a Carolina course designed to teach faculty how to use the Internet in their teaching. Since the inception of the CCI, many other resources to assist faculty in adding technology to their courses have been developed on campus, including the Center for Instructional Technology and the Technology in Context Consortium.

The CCI's Intel-based laptop standard allows the University to more effectively offer services and control costs. Using a laptop provides portability and therefore access to learning resources and student services anytime, anywhere.

All campus residence hall rooms are wired to give students direct access to campus networks and the Internet. Classroom buildings are systematically getting added to the network, though the age of the University's historic buildings presents obstacles. However, an ambitious networking and classroom renovation plan has been in place for several years to ensure that campus buildings can support the growing demand for technology. In buildings that present major wiring obstacles, wireless Ethernet is being explored as a solution.

Incoming freshmen will be eligible for need-based financial aid in the form of grants to cover all or a portion of the cost of the laptop. For all other students, subsidized, low interest computer loans are available to all Carolina students regardless of financial need for the purchase of CCI computers.

Virginia Tech

Virginia Tech, a major land-grant research university of 1,500 faculty and 25,000 students, faced a serious challenge in 1991-93 as it grappled with a series of severe budget cuts amid calls for improving undergraduate education. To cope with the sudden loss of budget and positions, the university restructuring plan recognized faculty as a core asset and cited investment in faculty development as a way to recover and regain momentum. A primary goal was to enhance student learning and improve instruction. To reach this goal, a plan was developed and implemented in 1993 for a university-wide Instructional Development Initiative (IDI) that would make significant use of instructional technology.

Between 1993-97, the university invested over $10M in the first phase of the IDI. A key component is the Faculty Development Institute (FDI). As a result of this commitment, more than 1,400 of the faculty both participated in three- and four-day summer workshops designed to support course transformation and received modern computer technology for their offices. A key point is that this program is recurring, so that intensive training opportunities and replacement technology is available to all university faculty at least every four years. In addition, over 500 student-access computers, each multimedia-equipped and networked, were installed in public labs and computer-intensive classrooms, and 50 presentation classrooms and seven distance learning classrooms were also implemented. To support course development, internal grants (over $500K each year) are competitively awarded to faculty from every college.

During 1998-2001, a second round of FDI workshops and computer replacements is occurring. Since 1998, every summer about 400 faculty participate in 3-day workshops and receive a replacement computer. Over half of the faculty have participated in at least two summer FDI workshops since 1993. We are now offering both desktop and laptop computers to faculty. Offering faculty a range of content choices when registering for a workshop (9 tracks for summer 2000) and computers (11 for summer 2000) is an important component of building and maintaining a positive attitude towards the program.

We anticipate changing the four-year replacement cycle to three-years and adding more seats for faculty (550/summer) starting in summer 2002. The workshop offerings are also expected to include asynchronous and hybrid approaches to provide more flexibility and just in time learning opportunities to faculty and graduate teaching assistants. These and other parallel activities represent a substantial commitment to improving instruction across the university. To our knowledge, the IDI remains the only large-scale continuing program of its kind in the nation. See www.fdi.vt.edu for more information."

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Abstract

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From Genesis to Infinity
or
from 0 to 50,000 Online Students in 2 Years

By April Weiss and Dr. Paul Kennedy
RMIT University
Melbourne, Victoria, Australia

Abstract

In two years RMIT University, Melbourne, Australia set up an online learning system for 50,000 students. This presentation reviews the infrastructure and basic services required for this level of growth.

Background

RMIT University is a large and diverse institution that provides programs to 52,000 students, from Certificate and Diploma (Community College) through 3-, 4- and 5-year bachelor (graduate) programs, to Masters and PhD. More than 20% of enrolments are direct fee-paying students from Asia and Oceania, with the balance funded by a direct government grant to the University.

During 1995 the Deputy Vice-Chancellor (Provost) initiated the development of a comprehensive Teaching and Learning Strategy. The strategy would provide the blueprint for radical and systematic change to the University's operations and set the student at the centre of a customer-focussed system that would compete effectively in a globalised education market. The strategy was driven partly by the decline in government funding, but primarily by a realisation that there would be a massive growth in demand for education, particularly in Asia, as the old-world economy was giving way to a global knowledge-based economy fuelled by the Internet.

During the 1990's RMIT, like many other educational institutions, experimented with IT-based flexible learning systems via a combination of mechanisms, including encouraging enthusiastic early adopters of technology and using a range of corporate sponsored projects. These learning systems were typically content oriented with an emphasis on the use of multi-media authoring tools and the maximum use of high-bandwidth content.

The University established a major project in 1998, designated the IT Alignment Project (ITAP), under the direct management of the Deputy Vice-Chancellor. The brief was to provide a strategic plan for the use of IT in teaching and learning by reconsidering all relative elements from student administration, through IT infrastructure to flexible learning technology.

The specific outcomes of ITAP were that the University Council (Senate) adopt the following objectives:

- Completely redevelop the student administration processes and adopt consistent corporate student-centred processes based on the 'customer is king' approach to customer relationship management.
- Acquire a student administration IT system that is web-enabled and capable of providing maximum student accessibility, automation and self service.
- Develop a single flexible learning platform called the Distributed Learning System (DLS) based on structured content delivery using an eclectic mix of media but with an emphasis on pedagogical design for flexible learning and binding the learners into a virtual learning community.
- Radically realign the corporate and departmental IT infrastructure to suit the needs of teaching and learning.
- Retrain academic, administrative and IT staff to effectively exploit the investment in IT.
- Complete refurbishment of the University web presence by using dynamic delivery of web pages sourced from an XML database of authorised meta-data catalogued content.

The University committed A $50 million over four years for strategic investment to achieve these objectives, starting in 1999. The development of the Distributed Learning System is the subject of this paper.

Distributed Learning System (DLS)

The initial design objectives for the DLS were as follows:

1. Create a single system to use across the whole University flexible enough to satisfy the full range of academic requirements and sufficiently adaptable to enable the integration of new tools as they become available.
2. Use software from vendors committed to the IMS standards, with an emphasis on buying commercial software rather than building from scratch.
3. Integrate software into a Learning Hub (portal) in order to provide straight-forward access by students into a variety of integrated learning system tools.
4. Integrate with the legacy student administration system to enable automatic control of access by students to only the courses in which they are enrolled.
5. Integrate with the Novell Network Directory Services (NDS) so that students require only one usercode/password combination to access IT resources within the University.
6. Create a scaleable three tier architecture with an Oracle database backend and platform independent (i.e. Macs and PCs) thin client.
7. Make the DLS disaster proof—use backup and business continuity specifications equivalent to major ERP systems (student administration, finance etc).
8. Use rapid prototyping to achieve a useable benchmark system quickly in order to provide academic staff with a production system on which to refine their understanding of the pedagogy of flexible learning.

Because of deficiencies in the commercial software and delays in standardising the University IT infrastructure, some short-term compromises had to be made to these objectives in order to produce a production system quickly. These were mainly workarounds that will be replaced as soon as the circumstances extraneous to the DLS permit.

Development Approach

The DLS was built and deployed in four phases. Phase one started in October 1998 with the establishment of the production team and a timeframe of five months to deliver the first working prototype in readiness for the (southern) fall semester of March 1999.

A systematic evaluation of commercially available learning management system (LMS) software was conducted (Lord, 1999,b) and a number of IMS participant vendors were identified.

A suite of tools was selected, so academics would be able to choose a tool that most closely matched the requirements of the learning activity they would be implementing online. Maximum involvement by academic staff as early as possible in the first phase was seen as critical to successful deployment.

Phase 1

For the first phase, it was decided to offer a prototype with a common login and front-end from which academics and students could choose to:

- access a learning management software,
- access an online content generator,
- have direct access to Internet sites.

Macromedia Pathware was chosen for the front-end and the content generator as several departments already used it for the latter purpose.

BlackBoard CourseInfo was selected for the primary learning management system (LMS). This product allowed easy Internet publishing by staff members plus offered a broad cross-section of features, including online assessment, discussion, file submission, and self-administration by staff members.

Question Mark Perception, for improved online assessments and surveys, and O'Reilly WebBoard, for online discussion and chat were included in phase 1.

A simple web registration tool for students was developed because of insufficient time to integrate the DLS with the University student records system. Academics had a choice of requesting students to self-register, or they could provide student lists to the DLS team administrators for input.

The DLS was developed using MS-SQL as the back-end because Blackboard CourseInfo did not support Oracle at this time. The hardware platform was a single Compaq Proliant server with 45 Gb of disc running NT, the University standard operating system.

The system ran for 24 hours a day 7 days a week, but officially only supported standard office hours. (Developers did, however, monitor the system during the night and on weekends.) The prototype was successful and was significantly over subscribed, as the original plan was to run a maximum of 20 courses.

A support desk was established to provide telephone assistance to students and academic staff in the use of the DLS.

For a summary of the relevant statistics for each of the phases, see Table 1: Phase Overview, in the Appendix.

Phase 2

Phase 2 development commenced in May 1999 for release in July 1999. The purpose of this phase was to provide additional functionality and to enhance the overall system performance.

The performance of Macromedia Pathware as the front-end and the mechanism for integration of the toolset was unsatisfactory particularly over slow connections. This was because of its dependence on Java and the need to download the driving software at each initial login to the system. To obviate this problem a new faster GUI interface denoted the 'Learning Hub' was written in ASP. For an example of a screen capture of the Learning Hub see the Appendix, Example 1: The DLS Learning Hub Interface.

The first level of Novell Network Directory Services (NDS) integration with the DLS was a major part of this phase. It was built using an LDAP query to the NDS passing the user ID and password and returning confirmation of a match. This proved to be a very slow process partly because of the replicated nature of the NDS database and the federated structure of the RMIT IT infrastructure. Also, because each department with a server on the Intranet had the ability to act autonomously in respect to the registration of users, the NDS tree was overly complex, logically fractured, and had a large numbers of duplicated entries. Consequently 'walking' the NDS tree was slow. A workaround was devised as an interim measure while separate action to standardise and rationalise the IT infrastructure was undertaken.

The workaround simulated the Novell catalogue service by walking the NDS tree once and building a database of user IDs and context that located the part of the tree where the user was registered. The authentication process used the user ID as an index into the database and returned the context that, along with the ID, was passed to the NDS. The database was rebuilt nightly to remain current. This approach significantly improved login times, but required nursing through the spring semester of 2000 due to intermittent faults that caused the failure of the overnight rebuild of the database, to go to completion.

With the use of NDS for user authentication, lost passwords, caused by the fractured nature of the NDS tree, constituted a major element of the help sought by students and these had to be passed to departments for solution. This problem was alleviated by giving the help desk access to change passwords.

Student registration was enhanced by adding a Registration Wizard that stepped students through the registration process. This module permitted students to self-register which was useful when their details were slow to enter the DLS via official university systems.

Also automated 'database connectors' were introduced, which enabled each of the application back-end databases to be automatically updated with student-course registration data, in batch mode overnight. Such a system design enabled a wide range of tools to be incorporated into the DLS in a cost effective manner.

While these processes worked satisfactorily from a technical point of view there was an issue in that academic staff could not understand why there was not an instantaneous registration of their students immediately after the start of semester. This was caused by the processing required by the student administration legacy system which is currently being replaced with PeopleSoft Student. Other problems related to inappropriate business processes, which had not previously shown up prior to real-time access controls being implemented.

Some additional services were added, including access to an online information database, by providing direct links to the bookstore and the Library. An additional server with a second copy of the prime LMS application (Blackboard CourseInfo) was added to enable academic staff to develop and test online subject content away from the production environment.

Phase 3

Phase 3 commenced November 1999 and was completed mid-February for the start of Semester 1, 2000. This stage required redevelopment of the system in terms of functionality, security and scalability in preparation for initial expansion to 25,000 students, 600 courses and 1500 staff members, then ultimate expansion to 52,000 students.

This phase involved a total code review, as some code had been created using code generators and there was concern that it was not efficient enough to support ultimate access by the total student population of 52,000 students. Where required the code was revised to ensure scalability.

It was at this time that the security was improved via the addition of SSL authentication for user IDs and passwords, plus extension of authentication checking was added so that each web page checks to ensure that the user was in fact currently logged in.

The student interface required additional functionality to improve the information provided to both students and staff about their schedules and the system. The interface was modified to include a calendar for students and a direct link for staff to the email tool Novell GroupWise, including display of their diary and number of unread messages. Also added were 16 online reports with Chrystal reports, as well as an improved Administration Tool. The Approval process was decentralised so the staff members teaching the courses could use the DLS to approve the students who were registering to learn online, rather than having the DLS team approve them.

As part of the ongoing integration with University data, a connector to University staff data was added to automatically import full-time staff records.

This phase also included integration with an RMIT developed online quiz package, WebLearn. This product was already in use by 3000 students. An ODBC connection was installed for communication between WebLearn which operated on Unix and the DLS which operated on SQL server in an NT environment. The only non-NT system was purchased for WebLearn and to also run timetabling software.

It was estimated that during 2000, the system would experience between 200,000 and 300,000 hits per day.

In order to handle anticipated increased number of students, plus provide some level of hardware redundancy, the hardware was increased from two to six servers, including one cluster with two web farm servers and two SQL servers. The web farm servers provided redundancy for each other. One SQL server was configured to run the non-distributed version of CourseInfo; it also provided redundancy for the second server which ran WebBoard and Question Mark Perception. The SQL databases were actually located on a RAID 5 array, which itself provided in-built redundancy if one hard disk should fail. For more information, see the Appendix, Diagram 1: DLS Hardware diagram.

Phase 4

Phase 4 development commenced May 2000 and was completed mid-July for the start of Semester 2, 2000. The object of this stage was to improve the robustness of the DLS, provide the infrastructure for 52,000 students, and to add functionality.

The highest priority for this phase was to improve the stability of the DLS. Primary focus of development was on the NDS Catalog Simulator module. A memory leak was resolved and design was improved, and the module was moved to a dedicated server. This decreased login time and improved reliability.

The hardware was reorganised for improved stability. A second server was installed to provide scalability to 52,000 students via program level access to WebBoard, whereby discussion areas could be set up for all University programs. CourseInfo was moved to a dedicated server for increased stability, scalability and performance.

During this phase, the cluster was deconstructured to reduce the complexity of the hardware configuration and resulting problems. Load balancing was switched off and will be replaced with hardware load balancing some time in late 2000.

Software improvements and further integration included:

- the option to remove all browser buttons so staff could select whether or not students could see the buttons;
- usability improvements to the login page and improved help;
- the addition of some end-of-semester functionality to assist with administration of courses, including courses and student archive functionality within the DLS;
- the addition of more statistical reports and some label generating reports;
- direct access to the student email system, NIMS (Novell Internet Messaging System). Unfortunately transparent login was not possible with NIMS, so students still have to re-enter their user ID and password.

With phase 4, the cluster has been disassembled and hardware redundancy which is easier to maintain in the University environment, is being implemented.

By the 4th quarter 2000 the full disaster recovery plan will be implemented, the system will be supported 24 x 7, and it will have redundancy for all servers. Business continuity plans include locating the redundant servers in a second building, ghosting all servers for quick disaster recovery, and performing hot backup to hard disk on the redundant server for quick restore.

All servers will have two hard disk drives and two power supplies, and use RAID 5 disk arrays that can experience one hard disk failure without disturbing normal server operations. Monitoring is currently provided by in-built 'Compaq Remote Inside Boards' plus 'What is Up Gold'. A software package with more elaborate call escalation definition is currently being investigated.

Proposed Future Development

RMIT is simultaneously implementing four enterprise systems in parallel and intends to integrate them all during 2001. The four systems are the:

- SAP HR and Finance system—this system went live in May 1999 and is about to undergo a major upgrade,
- Academic Management System (AMS) using PeopleSoft Student 7.6—due to go live in April 2001,
- Distributed Learning System,
- rationalisation of all the websites in the University into a single meta-data catalogued XML database using SIM technology—see http://www.simdb.com.

The DLS-AMS, AMS-SIM and DLS-SIM integration provide some significant technical and policy issues but also major opportunities to enhance the performance and customer perceptions for the DLS. Each of the AMS, SIM and DLS will provide portal functionality and there is a major challenge in seamlessly connecting these together.

SAP HR and Finance system

The DLS will be insulated from the SAP HR/Finance system by the AMS – all data required from SAP will be extracted from the AMS.

DLS-AMS Integration

Staff and students will be able to access HTML Access (previously Campus Connection) inside the RMIT virtual private network (VPN). The NDS-Single Sign-on system will control student entry into the VPN. Once authenticated into the VPN, students will be able to access all systems (SIM, DLS and AMS) without having to re-authenticate. HTML Access will check the student's identity on entry to the portal via an LDAP query to the NDS. Once in HTML Access, the student will only be able to transition to the DLS from an enrolled course and this information will be passed to the Learning Hub, which will use the same LDAP process to check the user identity and then pass through to the specific course area.

The AMS will populate the NDS and hence all enrolled students will be automatically registered to use IT resources within the VPN. With PeopleSoft 7.6 this will be done by file download/upload but it is anticipated that with version 8 the NDS will be updated on a unit record basis at the time a student enrols. This will significantly reduce the latency so that students who enrol offshore via the web will be able to access online learning resources immediately after their fees clear.

DLS-SIM Integration

Rationalisation of the web using meta-data catalogued XML front-ended by a very fast search engine will allow RMIT to create and manage web content efficiently. The primary authoring tool, Microsoft Word and standard templates permit users to create combined image and text documents which are automatically converted to XML, catalogued and stored in the database. Any other resource can also be catalogued and stored in an XML 'wrapper'. This technology also provides opportunities to enhance the DLS by enabling the construction of courses using meta-content. Content will be stored as meta-data catalogued objects in the XML database and served dynamically to students. This will facilitate the reuse of learning objects, provide the capacity to build special purpose courses quickly and enhance the flexibility of course design by adding another level of content connectivity beyond that offered by the LMS tools.

Parallel IT Infrastructure Refurbishment

The DLS is the first University-wide system to be deployed for general student use at RMIT. Until now student IT services have been provided on a departmental or faculty basis. The rollout of the DLS brought into sharp focus the problems of deploying an enterprise system across a large intranet in which could be found non-standard servers, different versions of network software and variations in configuration of the network software.

University Network

The RMIT (intra) network is a loose federation with a central core switching ATM mesh maintained by the Information Technology Services (ITS) department, and local switching and servers owned and maintained by academic departments. A degree of uniformity was achieved by site-licensing Novell Netware and NT and requesting consistent version releases across the platform.

Under the ITAP brief for '*Radical realignment of the corporate and departmental IT infrastructure to suit the needs of teaching and learning*' (Caldwell et. al., 1998) standards have been developed and are being implemented. The achievements of this approach over an 18-month period are extensive.

The first step in standardising the IT infrastructure was the appointment of academic Directors of Information Technology (DoIT) in each of the seven faculties that receive some central funding by the University. The DoITs comprise the major advisory body on IT issues to University management. A Faculty IT Manager (FITM) with a technical background was appointed in each of the faculties with the authority to determine technical issues and responsibility for ensuring compliance with mutually agreed standards. The FITMs developed a network standardisation policy for the entire network, which was adopted by senior management on the recommendation of the DoITs.

All IT staff in the University were offered industry accredited training (Microsoft, Oracle, Novell) as part of a Graduate Certificate in IT—more than 60 staff have enrolled in these courses, which are fully funded by the University.

The NDS tree was rationalised and containers standardised so that all enrolled students could be automatically centrally registered from the student records database. All NDS replicants are required to be maintained on corporate standard servers to maximise availability. There are at least three replicants of each partition and students are allocated to a partition based on the faculty in which they are enrolled. One replicant is held on a central server while the other two are located near the areas most frequently used by the students in the faculty.

All Novell servers on the network are required to be upgraded to run Novell Netware 5 and deadlines have been set, after which any non-complying server will be disconnected from the network. During the fourth quarter of 2000 the NDS will be upgraded to version 5.1, then the Novell Catalog Service and Single Sign-on will be implemented.

Control of local switching has been transferred from faculties and departments to ITS and data reticulation will be managed on a 'whole of building' basis so that departments can install their servers in a common machine room in each building and be assured of sufficient switching capacity to connect as many end-user devices as there is floor space to accommodate.

The logical topology of the network is also being standardised to eliminate slow proxy bottlenecks.

By the beginning of 2001 the operation of the DLS can be evaluated without the confusion of infrastructure instabilities.

Outcome

The development of the RMIT Distributed Learning System has taken the University from a cottage industry model to a fully fledged enterprise system for flexible online learning, integrated with our legacy student administration system and capable of integration with the PeopleSoft student system when it goes live.

The decision to rapid prototype the development over four release phases has paid dividends. Particularly by developing a widespread understanding, among academic staff, of the opportunities for learning management systems to add significant value to teaching and learning.

The University has established that it is possible to have a central system for flexible learning which is future proofed, by use of the IMS standards, and capable of delivering reliable and secure service to students with a minimum, and reducing, level of access complexity.

RMIT is now in a position to develop a central rapid prototyping courseware production facility which enables maximum engagement of academic staff who do not have the specialised technical skills to produce a useful outcome. The use of meta-content and meta-data catalogued courseware components will greatly assist this.

Rapid protyping of this type of system with short lead times to 'go live' is living life in the fast lane, particularly if the IT infrastructure is being rationalised on a just in time basis. Were we to repeat the process, we might do it differently. The success of the project is due to two major factors: the vision, ingenuity and persistence of the system architects and implementers; and serious executive sponsorship. It would be foolhardy to commit to this type of project without these two prerequisites.

Appendix

Table 1: Phase Overview

Phase	Servers	Courses	Students	Staff	Time in person years	Development Duration	Availability	Hits
1	1	45	720	40	1 year	4 months	90%	-
2	2	225	8342 (5500 active)	165	1 year 2 months	4 months	91.4%	40,000
3	6	797	21,407 (7,415 active)	530	1 year 3 months	4 months	99.3%	280,000
4 (start of semester)	6	933 (404 active)	N/a	N/a	7.5 months	2.5 months	To be assessed	N/a

Example 1: The DLS Learning Hub Interface

The example below shows the DLS interface that academics see after logging in. The student interface is very similar.

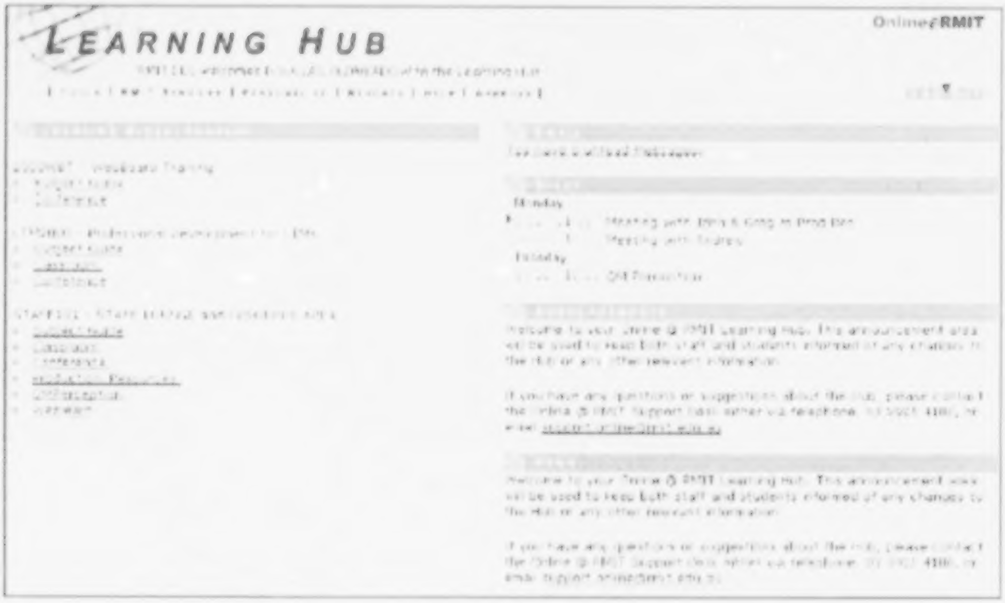

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Diagram 1: DLS Hardware diagram

Note: each server is identified by a different name. It does not reflect the hardware make or model.

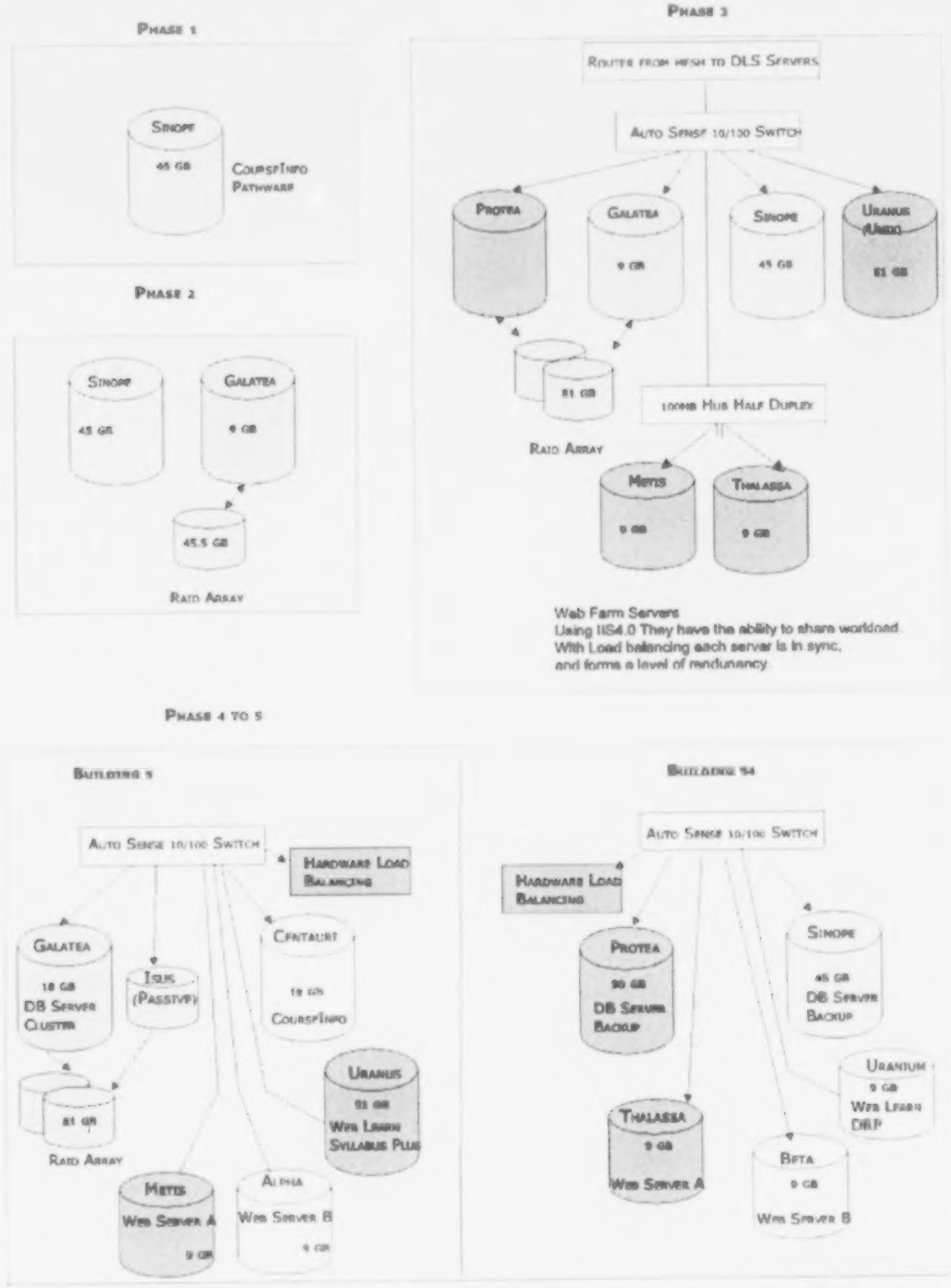
PHASE 1
SINOPE
45 GB
COURSEINFO
PATHWARE
PHASE 2
SINOPE
45 GB
GALATEA
9 GB
45.5 GB
RAID ARRAY
PHASE 3
ROUTER FROM HESH TO DLS SERVERS
AUTO SENSE 10/100 SWITCH
PROTEA
GALATEA
9 GB
SINOPE
45 GB
URANUS
(UNIX)
81 GB
81 GB
RAID ARRAY
100MB HUB HALF DUPLEX
METIS
9 GB
THALASSA
9 GB
Web Farm Servers
Using IIS4.0 They have the ability to share workload
With Load balancing each server is in sync,
and forms a level of redundancy
PHASE 4 TO 5
BUILDING 5
AUTO SENSE 10/100 SWITCH
HARDWARE LOAD BALANCING
GALATEA
18 GB
DB SERVER CLUSTER
ISIS
(PASSIVE)
CENTAURI
18 GB
COURSEINFO
81 GB
RAID ARRAY
URANUS
18 GB
WEB LEARN
SYLLABUS PLUS
METIS
WEB SERVER A
9 GB
ALPHA
WEB SERVER B
9 GB
BUILDING 94
AUTO SENSE 10/100 SWITCH
HARDWARE LOAD BALANCING
PROTEA
90 GB
DB SERVER
BACKUP
SINOPE
45 GB
DB SERVER
BACKUP
URANIUM
9 GB
WEB LEARN
DRP
THALASSA
9 GB
WEB SERVER A
BETA
9 GB
WEB SERVER B

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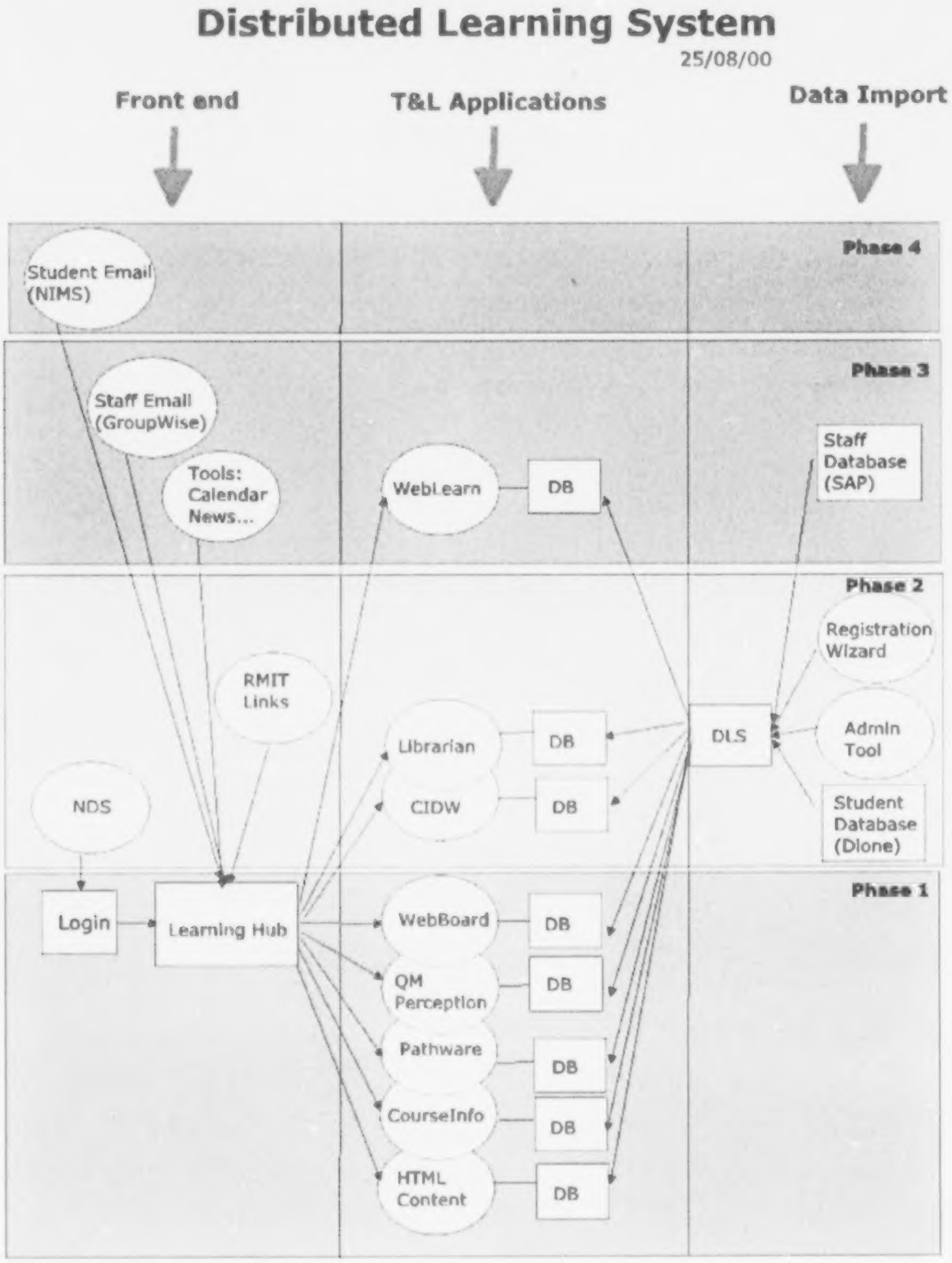
Diagram 2: DLS Software diagram


Distributed Learning System
25/08/00
Front end
T&L Applications
Data Import
Phase 4
Phase 3
Phase 2
Phase 1
Student Email (NIMS)
Staff Email (GroupWise)
Tools: Calendar News...
WebLearn
DB
Staff Database (SAP)
Registration Wizard
RMIT Links
Librarian
DB
DLS
Admin Tool
NDS
CIDW
DB
Student Database (Dione)
Login
Learning Hub
WebBoard
DB
QM Perception
DB
Pathware
DB
CourseInfo
DB
HTML Content
DB

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Product	Developer
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CourseInfo	Blackboard Inc.
GroupWise	Novell
Macromedia	Pathware
NDS	Novell
NIMS	Novell
Perception	Question Mark Computing Ltd.
WebBoard	O'Reilly & Associates
WebLearn	RMIT University

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Abstract

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ID Number:	EDU0019
Title:	IT Asset Management: What Computer Equipment Do You Own and Where Is It?
Author:	Charlotte Lenox and Karla Nelson
Organization:	Baylor University
Year:	2000
Abstract:	Baylor University has implemented an IT asset management tool that features dynamic automated inventories, remote control, software distribution, software metering, and a Web interface. This paper shows how Baylor has used this powerful tool for more accurate technology planning and management of a multi-platform environment.

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IT Asset Management:
What Computer Equipment Do You Own and Where Is It?

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Abstract

Baylor University has implemented an IT asset management tool that features dynamic automated inventories, remote control, software distribution, software metering, and a web interface. This session demonstrates how Baylor has used this powerful tool for more accurate technology planning and management of a multi-platform environment.

"Information technology is a duck. In itself, a duck is a net consumer of resources; it must be contained, requires constant care, becomes less valuable with age, leaves a mess wherever it treads, and is counterproductive until converted into practical application. Caring for ducks requires partners, those who grow the grain, mill the feed, and make the fence wire. Ducks have a mind of their own. They are oblivious to their purpose, and require proactive management if they are to effect a positive result. . . As I look at us, those who consume and implement technology, I see that we have become focused on making faster ducks---whose meat tastes no better, whiter ducks---whose feathers are no softer, bigger ducks---with eggs no larger, and smarter ducks—whose intellect does nothing but make them more difficult to manage. Alternatively, we must become duck farmers. This requires that we change our focus from the duck to those consuming the duck, to those supporting our efforts to produce the duck, and to the management of the duck."[1]

I will translate this last sentence to mean that our focus should be on our clients and departmental organizations as those who consume the duck. We need to focus on our software and hardware support staff, helpdesk staff, and those who handle software licensing. These are the folks who support our efforts to produce the duck. Finally, the management of the duck is financial administration and technology planning.

In our presentation we will discuss how we evaluated and found ways to change our asset tracking processes. We'll describe how we went about choosing a software package for asset management, including what features we found available and which ones mattered to us. Then we will give an overview of the implementation of the package we chose; we'll discuss the hardware configuration, software installation on both the server and client units, and how we communicated our plans to the clients. We did have problems, such as technical issues with the software itself, surprises about personnel time involved, and political problems with some departments on campus, and we will share those with you. Lastly, we will wrap up with a status report of where we are now in the implementation process and what results we are experiencing.

Balor University owns approximately 4600 desktop computers. Through the Baylor Computer Store and the Installs Group, the Information Technology Center provides procurement and installation for all new computers on campus. Traditionally we have tracked these assets with a FileMaker Pro database via sneaker net. As part of each comptuer installation and computer move, the Installs Group completed a worksheet listing the computer's vital statistics along with room number, user name, department number, and purchase order. That data was then manually entered into the asset database. On a rotating basis throughout the year, we also conducted physical inventories in the departments. You can imagine how eager the departments were to see us coming! We continually analyzed this process and inplemented improvements such as scanning the serial numbers and asset tags rather than manually writing them, or scanning directly into the database with manual "clean up" on the room numbers and user names. Whatever we tried, it continued to be a cumbersome process at best. As we know, computers don't stay in one place, and elves can change the configurations and upgrade or downgrade computers overnight. The phrases "herding cats" and "nailing Jello to a tree" come to mind.

We used this database for administrative reports. Such reports were for the financial administration to use in technology budget planning as well as for documentation in calculating

ITC support costs. Our hardware and software support groups used this database to give them (very limited) background data before going on-site for a trouble shoot. This database gave us no information about the software on our computers. We tracked software from the sales records in our computer store. We had no way to know which computers the software was installed on, or how many computers may have gotten an installation from each purchased copy. There was no record of software purchased outside the computer store. When Karla Nelson was hired at Baylor to coordinate our IT asset management, she began evaluating and recommending changes to our asset tracking system.

Wouldn't it be beneficial to know what kind of equipment we have and who is using it? Is there a better way to keep track of the equipment and software that we own? Is there a system that could also meet the needs of our IT support team? These are the some of the questions we ask ourselves and that encouraged us to begin a search for a better system. We want to share with you how we went about choosing and implementing a new system and what problems and results we have had.

One thing we knew for sure is that equipment information provides the essential link in connecting the IT support team to the client. When ample data can be obtained on the client the troubleshooting process is less problematic, and administrative tasks, such as planning and budgeting, will become more effective.

We formed a team to research and evaluate other alternatives. We found a wide range of products that offered some advanced technology in asset management. It was soon determined that there were several qualities we felt were essential to get the results we needed. Each product researched was given the following criteria to live up to:

- **Multi-platform support**. Baylor University has a heterogeneous environment consisting of approx 50% Machintosh and 50% Window PCs.

- **Robust, relational database**. A scalable system is crucial with the rapid changes in technology.

- **Automated and accurate data collection**. Experience with our past system taught us that unless the data was correct it was not very useful.

- **Global system**. Realizing the potential benefits to a diverse group of people, concentration on multi-featured products became a high priority.

- **Well-designed product**. Quality in design was essential.

- **Reputable and knowledgeable product vender**. Since the system would be used by such a large group of people we felt support for the product was a must.

Months were spent researching what products were available. We were surprised at how many there were. Many of them were eliminated because they did not support the Machintosh client. We did however find a few worthy of a closer look. We installed a total of four in-house pilots for a period of 3 months each. The pilots allowed us to setup on-site a complete system with up to 25 client machines. These pilots gave us a clear picture of the software's architecture, what data could be collected, and effects on the clients and network in our environment.

Although all of the products we tested had several good qualities, we determined the one that best fit the needs of Baylor University was Intel LANDesk Management Suite. LANDesk provides a fully automated hardware and software inventory on a schedule of our choice. It supports Oracle and SQL databases and also includes remote control, software distribution, software metering and web access features. We also found it featured in the PC-Week April 19, 1999 Shoot-Out as the top desktop management package.

It became apparent during our evaluation stage (by installing the onsite pilots and talking with existing customers) that this software was not a plug-and-play type software. The Intel Corp referred us to their Deployment Value Added Reseller (DVAR) for assistance in the purchase and deployment of the LANDesk product. We selected a DVAR out of the Dallas area to work with us on establishing a custom designed plan for Baylor's network environment. They would also assist with the installation of the software and provide on-site staff training. The installation was implemented in the three phases.

Phase I involved extensive planning of hardware requirements and examining our existing infrastructure design to establish an installation plan. Some of the information that had to be gather included the following:

- Total number of nodes
- Server requirements
- Line speed and number of remote sites
- Number of domains
- Which LANDesk features did we want to install and how were they to be configured
- Available servers for the service center's installation
- Type of database to use

In Phase II we installed the core components using the design plan developed. The following give a brief description of each component (*see appendix B*):

- **Core Server** processes the inventory scans from the clients and sends it to the production database.

- **Production Database** contains the system operations for the Oracle Server. It records information about users and the configurations for the databases.

- **DataMart Service Center** is a database that extracts information from a management database to provide fast access when querying that data or generating reports.

- **Service Centers** are servers that host one or more management services. Service Centers reduce the load on the core server for the following services: Client

Deployment, Software Distribution, and Software Metering. Service centers were installed on two existing servers for our environment.

- **Management Console** is used to conduct management activities such as taking remote control of a managed node, viewing inventory data and scheduling software distributions. Baylor installed nine management consoles on ITC support staff computers.

- **Web Console** offers a subset of Intel LANDesk Management Suite's functionality from a Web browser. The management console is the main resource for managing computers, but the Web Components are useful when the console isn't available. Ten Web Consoles were setup for our help line and other software support team.

Phase III deployed the software to our clients. The Window machines' installation was automated using network login scripts to run a batch file to install the software. The Machintosh clients had to be installed manually. This phase consumed the greatest amount of time due to the fact we had to physically touch each of our Macintosh clients.

The planning, installation, and deployment of this product took approximately 9 months. An additional 3-4 months was spent customizing data and reports. We encountered several bumps and bruises along the way. We had problems on the clients ranging from general error messages to the system locking up entirely. We discovered that the software metering module that was installed created most of the problems we were having on the clients. This was not a feature we were benefiting from and decided to completely remove it's components from our clients. Other than the metering issues we only encountered a few isolated problems on the clients. Database issues were found. Some of the major problems we had were not being able to view all of the client's data from the Web Console, and the custom data we entered would not permanently remain in the database. We installed several patches released from Intel that corrected the problems. The attention needed on these issues demanded a lot of time from our network administrators, database administrator, and other technical support staff that was not originally expected. Ongoing upkeep is needed to stay current on newly released patches and upgrades from Intel.

We also faced some in house issues with our clients. Letters were sent to all department heads notifying them of the new software and requesting them to inform the faculty and staff in their department. In some cases, not any form of advanced notification or information given to the client would have made any difference on the acceptance of the software. We were often accused of being "Big Brother" and "installing spy software". We had one comment overheard in a staff dining room, "ITC can now tell when you are playing games on your computer. They have already had one person fired because he was caught playing games." However, we found the majority was receptive to the software. Informing the clients of the purpose of the software, as we went, put any uneasiness to rest.

As the project came together we did begin to see the benefits that we had expected from this tool. Our help desk and technical support teams have found the remote control feature to be an essential tool. It has enabled them to work together with the clients as they both view the problem simultaneously. The remote control feature is also utilized by our network administrators to access servers located on the other side of the building and across campus. An additional level of security is assigned when the client software is installed on a server.

The inventory scan produces a plethora of data in the database on each device (*see appendix A*). It collects both hardware and software information. We have the capability to add custom data to the device's record that identifies the users name, department account number, asset number, ect. Through various reports this comprehensive inventory information can provide justification for upgrades, purchase decisions, problem solving, and other organizational needs. We can easily determine which clients need the latest software upgrade by generating a report. There are limitations to this inventory system. If the computer is not connected to the network it cannot be automatically scanned into the database. However, a scan can be run at the client and saved to a disk and then imported into the database. Equipment such as printers, scanner, and monitor cannot be recorded in the database as a separate record and have to be tracked manually. Also, many of our faculty and staff have Baylor owned computers they use at home. We decided not to install LANDesk on these because any personal computers dialing in would be installed as well. An additional batch file was created and added to the login script to check for a dial-in connection to prevent any personal computers from being installed. A manual record is kept on home computers.

Baylor has ongoing plans to integrate LANDesk with two other systems. First, our helpdesk has recently installed Heat, a helpdesk software package by GoldMine Software Corporation. Integration with this software would provide the LANDesk inventory information along side the client's helpdesk record. We feel this will give our helpdesk additional information that could be useful in troubleshooting problems. Second, we are looking at integrating with our PeopleSoft financial software. Depreciation and the net worth of the University's assets are calculated and recorded in our Controllers office. We are researching the possibility to pull our LANDesk data into PeopleSoft. This would greatly improve the accuracy in our financial records as well.

Intel has shown a desire to enhance this product to keep up with new technology. Intel has also shared with us their commitment to continue supporting the Machintosh platform. We will be participating in a beta test on an enhancement pack they are developing that includes many enhancements to the Macintosh as well as some added Window enhancements. Since we have purchased this product Intel has added a new module to their suite called Targeted Multicasting Software. This module is purchased separately from their packaged suite. We decided not to purchase this module at this time. Software distribution is one area that we have not used extensively. We do plan to utilize the software distribution feature as soon as time and staff resources become available. We are continuously discovering new and improved ways to use this asset management tool. The benefits are growing with time as we make use of its wide range of features.

In summary, we chose LANDesk because of the features that mattered in our environment: support for both Mac and Windows platforms, software distribution, remote control, and of course inventory scanning for both hardware and software. We scan for hardware attributes at every startup and for software every two weeks.

We found the cost of setup to be reasonable. After buying the LANDesk software and 5000 client licenses, we purchased three Dell servers, extended our Oracle license, and engaged a DVAR for consultation throughout the setup and implementation. We installed LANDesk on the Windows machines using the software distribution feature through login scripts; installation on the Macs was manual. We borrowed staff from another ITC group, and they, along with two student workers, assisted Karla in the Mac installations.

Administrative support for this project was crucial; we had the full backing of our Vice President for Finance and Administration. We issued a letter to all department heads explaining the purpose of the software and how it would be installed. We also published an article in our IT newsletter about LANDesk. In retrospect, we should have put more effort in educating our clients before installing the software. Perhaps the letter to department heads should have been followed up with another letter to all employees with more detailed explanation. Overall, the product was fairly well received.

We encountered some technical problems. I feel that we would have had far more trouble than we did had not our DVAR mapped out a fairly structured implementation plan at the very beginning. Intel was helpful in working through a lot of the bugs, including some of the issues that were unique to our campus. We underestimated the magnitude of this project. We had to call on our DBA to assist with setting up the Oracle database servers and to help when technical problems arose that involved the database. Two of our systems engineers have given many man-hours to this project, and their help will continue to be needed, albeit to a smaller degree, as we maintain and expand the system. It would have helped to realize these facts at the beginning. Two of our schools, the School of Business, and the School of Engineering and Computer Science chose not to allow LANDesk to be installed on their computers. These two schools have some degree of IT autonomy and would not be forced to participate. We have hopes of including the School of Engineering and Computer Science in the near future.

Outside of the School of Business and the School of Engineering and Computer Science, LANDesk is now installed on 95% of Baylor's computers. After installation was complete, a lot of data entry was required to match each computer with a Baylor ID tag, room number, department account number, and user name. We have recently started generating reports from LANDesk for the administration to use in budget and technology planning. Our support staff have been using the remote control feature and information from the web console since last fall. We see the upkeep of this system to be continual, but that is to be expected. We are in the process of creating web access for departments to view the hardware and software data for their areas.

In closing, our advice to another institution in setting up an asset tracking system would be first to choose carefully. If you are buying a software package, decide which features are important in your environment. There are many packages available at varying prices. LANDesk was not inexpensive, but for the features it gave us – features we decided were important – the price was reasonable. Don't underestimate the time and man-hours needed for such a project. And finally, communicate with your clients.

[1] Chris Jesse, A Journey Through Oz (Kendall/Hunt Publishing Company; Dubuque, Iowa, 1997)

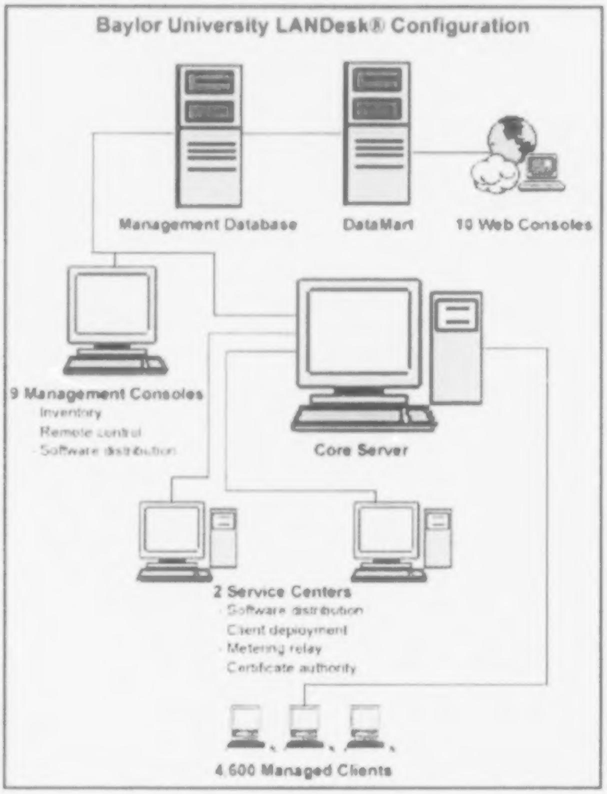
Appendix A

PARTIAL LIST OF ATTRIBUTES COLLECTED BY LANDesk

BIOS - Asset Tag
BIOS - Copyright String
BIOS - Date
BIOS - ROM Size
BIOS - ROM Version
Bus - Type
Coprocessor - Math
Keyboard - Code Page
Keyboard - Number of Function keys
Keyboard - Type
Mass Storage - Floppy Drive Count
Mass Storage - Floppy Drive (0) - Type
Mass Storage - CDROM (0) - Drive Letter
Mass Storage - Fixed Drive (0) - Total Storage
Mass Storage - Logical Drive (C) - Available Storage
Memory - Physical - Bytes Available
Memory - Physical - Bytes Total
Modems - Baud Rate
Modems - Manufacturer
Modems - Model
Mouse - Buttons
Mouse - Type
Network Adapters - Network Adapter (0) - Description
Network Adapters - Network Adapter (0) - Vendor
Network - NIC Address
Network - IPX - Address
Network - IPX - Network Number
Network - IPX - Node Address
Network - TCPIP - Address
Network - TCPIP - Host Name
Ports - Communications Port (COM1) - Name
Ports - Communications Port (COM1) - Address
Ports - Communications Port (COM1) - Maximum Speed
Ports - Communications Port (COM2) - Name
Ports - Communications Port (COM2) - Address
Ports - Communications Port (COM2) - Maximum Speed
Ports - Printer Port (LPT1) - Name
Ports - Printer Port (LPT1) - Address
Printers - Default Printer
Printers - Printer (0) - Name
Printers - Printer (0) - Printer Port
Processor - Processor Count
Processor - Speed
Processor - Type
Processor - Vendor
Processor - Features - MMX(TM) Technology
Software - Name
Software - Version
Software - File Size
Software - Path
Sound Card - Manufacturer
Sound Card - Type
Video - Colors
Video - Resolution
Video - Adapter (0) - Adapter String
Video - Adapter (0) - Memory
Video - Adapter (0) - Type

**partial list only-other attributes collected are not listed*

Appendix B



Baylor University LANDesk® Configuration

Management Database
DataMart
10 Web Consoles
9 Management Consoles
- Inventory
- Remote control
- Software distribution
Core Server
2 Service Centers
- Software distribution
- Client deployment
- Metering relay
- Certificate authority
4,600 Managed Clients

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Abstract

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ID Number:	EDU0049
Title:	Learning Village: Connecting Homes, Campuses, and People
Author:	James D. Robinson, Thomas D. Skill, and Brian A. Young
Organization:	University of Dayton
Year:	2000
Abstract:	This session describes the experience of connecting campus buildings, students, faculty, staff, alumni, local schools, and 400 single-family homes to a high-speed voice, video, and data system. Explore the legal, ethical, and moral issues concerning when you provide this kind of access to your "Learning Village."

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Abstract

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ID Number: EDU0001

Title: Leveraging Your State Universities' Software Licensing to the Max: Opportunities, Benefits and Retrospective Review

Author: Debra H. Allison, Charles H. Sechler, and Amin R. Shafie

Organization: Miami University, The Ohio State University , and University of Cincinnati

Year: 2000

Abstract: Thirteen state universities and two freestanding medical schools in Ohio collaborated to negotiate a major licensing agreement with the Microsoft Corporation. The panel will review the myriad business, legal, and technology issues that were confronted to deliver robust but low-priced software services to more than 300,000 users.

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Leveraging Your State Universities' Software Licensing to the Max: Opportunities, Benefits and Retrospective Review

Project Overview Summary

Presented by
Amin R. Shafie
The University of Cincinnati
Cincinnati, Ohio

The idea of negotiating a Microsoft software licensing agreement for all Ohio's public universities originated at a meeting of the IUC-CITC in June 1998.

What is the IUC? What is the CITC? The IUC refers to the Inter-University Council of Ohio and the CITC refers to the Council's CIO Committee. The IUC is a voluntary educational association of thirteen (13) public universities and two free-standing medical colleges. According to the IUC documents, the purpose of the association is to "facilitate the development of common interest and concern of its members and to assist in sustaining and improving the quality of public higher education". The Council consists of the president from each of the member institutions and the position of the IUC chair rotates annually among the members. The Council operates with five standing committees of senior university officers: Provost, Business & Finance, Student Affairs, Legislative Representatives and Human Resources. Special ad hoc committees may be established to consider particular subjects or issues (e.g. the Campus Information and Technology Committee, the Legal Counsels, the Purchasing Group, etc.). All committee recommendations are reported back to the association for final consideration of action. The activities of the IUC are carried out through the office of Executive Director James E. McCollum and his staff in Columbus, Ohio.

Once the basic terms and conditions of the negotiated agreement were agreed to by the concerned IUC committees, Microsoft presented three legal and inter-related documents: 1) a Microsoft Education Select Master Agreement that was signed by the IUC Executive Director and Microsoft; and 2) a Microsoft Select Education Enterprise Enrollment Agreement (Custom) that was signed by each participating university, Microsoft and the selected large account reseller; and 3) an Amendment to the Master Agreement to cover issues such as Work At Home Rights, Year 2K Warranties, Extension Options, etc. Each participating university provided its FTE statistics on the Enrollment Agreement it signed. A reseller was selected via an RFP collaborative effort involving representatives from the IUC Purchasing Group, the CITC negotiating committee and the IUC assistant director, Cindy McQuade. And to tie the selected reseller to its RFP commitments, the IUC and the reseller signed a separate legal document. Throughout the project, the Office of Legal Counsel at Ohio State University provided exemplary legal services to the IUC and was the primary liaison with Microsoft's legal team.

All legal documents were signed by mid September 1999 and the Master Agreement became effective on 22 September 1999. In anticipation, the CITC had created an IUC-Microsoft consortium on 21 July 1999 to coordinate the implementation of the contract. Colleagues at Indiana University were very helpful to members of this consortium as they gave us permission to adapt and copy related information from their web site. We are very grateful for their cooperation.

Outcomes and Achievements Summary

Presented by
Charles H. Sechler
The Ohio State University
Columbus, Ohio

The custom enterprise license provides a Microsoft software suite to 275,165 Full Time Equivalent faculty, staff and students. Because part-time faculty, staff and students are figured into the FTE formula as fractional values, the actual number of persons covered is much higher than 275,165. The desktop software consists of Office 2000 Professional, Office 98, Visual Studio Pro, Front Page, Windows 32-bit Operating System Upgrades, and BackOffice Client Access License. Software is provided for Windows and Macintosh platforms.

Standard and Enterprise servers are allotted per 100 FTEs so that a total of 2750 servers were distributed to the schools based on their FTE count. These included Windows NT/2000, SQL and Exchange servers.

The license agreement contains several key provisions. The students own the software and may use their existing versions indefinitely after they leave school. This is an important legal issue in view of the mass distribution of the software. It would be problematic trying to recover the software from all departing students. Faculty and staff may use the suite at home and on campus. The license for use of the software on the campuses is perpetual. Copies purchased with institutional funds for faculty/staff are owned by the institution and remain with the institution after a faculty or staff leaves. The latest versions of software are available over the life of the license.

The cost of the license per FTE per year is extremely low. In addition, the pricing, once set in the first year is fixed over the three-year term of the agreement. School budget needs for this are predictable from year to year. Finally, schools may resell the licenses to students, thus allowing schools to recover some of the cost of the license.

One additional but very significant accomplishment was the creation of the IUC-Microsoft consortium to oversee the operational implementation of the license on each of the campuses. A whole range of information has been shared, ranging from technical knowledge and legal interpretations to user documentation, procedural questions, to rollout distribution statistics and the sharing of overstocked media. A listserv discussion list for the consortium members led to a desire for the technical folks at the schools to share knowledge and quickly led to a listserv for them. It has fostered an environment where knowledge sharing could be encouraged and developed.

As for failures, the most notable was the inability of the negotiating team and Microsoft to get the license signed before the beginning of most schools' new academic year. A number of factors contributed to this, the most important being the need for coordinated communications among so many participants. Long periods were needed to communicate the proposal from the CIOs to provosts, financial officers, purchasing officials and to presidents as each level approved and made recommendations.

Another contributing factor was complex legal negotiations. Microsoft did not give schools a draft of the license until late May even though they had been working since January to get schools to agree to their proposal. Microsoft did not include points into their draft license that had been agreed on, such as home use for all products in the desktop suite and enterprise servers. These had to be negotiated back in to the license. Some of the items contained in the draft license were taken out at the last minute, such as access to products that replace a product in our suite. Apparently, Microsoft salespeople were not always getting corporate approval of things they were proposing.

We also wanted some base level of support access to Microsoft by phone as part of the license, but at the pricing we were discussing; they would not include that.

In the end, however, the overall agreement has turned out to be a large success. The great majority of objectives were indeed achieved. Distribution of the desktop suite has been extensive at most of the schools to date. It has provided a great value for use of the software at these Ohio schools.

Importance and Relevance Summary

Presented by
Debra H. Allison
Miami University
Oxford, Ohio

Given that a Consortium of the 15 institutions was created to accomplish the contract and manage it throughout its life, we had an opportunity to leverage our knowledge for others and ourselves.

To establish a collaborative effort of this magnitude, look to statewide groups that may currently exist, such as a statewide consortium of your CIOs or Purchasing Directors. For management of a multi-campus software effort, create a group with one representative from each institution and one representative appointed by purchasing. Establish a sub-group that issues the RFP and evaluates responses. Within your campus, bring together your purchasing, IT, retail point of sale, library, as well as distributed technology support staff.

We identified these critical success factors:
- Overriding Need
- Top Level Support
- State flagship university or large institution on board
- Established relationship among CIOs, Purchasing Directors, and Campus Legal Counsels
- Strong leadership on the team and good software negotiators
- Collaborative Team
- Communication among all involved
- Central campus funding plan

Potential pitfalls include lack of established procedures, timing for involvement of purchasing and legal teams, time to communicate when so many people are involved, the business climate which may not support your LAR long-term, and the collaborative university culture.

Positive reactions on campus came from the support folks who were pleased that upgrades were pre-funded, and nearly everyone was amazed at the purchase price.

Negative reactions on campus came from faculty were concerned that this contract might lead to reduced software options on campus. This was not an effort to impose Microsoft on campus, but an effort to obtain the most widely used software as economically as possible.

There was criticism of the contract restrictions. Criticism also came in response to implementation after the academic year began. Among our inter-university group, we found that the contract lends itself to multiple interpretations.

Total costs to administer the campus-wide agreement involve an eligibility and tracking system for multiple points of sale, customer license agreement storage, CD duplication, a loan program for those products students cannot purchase, a point of contact for contract and customer issues, and web site management.

With respect to savings under this contract, it seems that the largest and smallest institutions clearly saved money. It is not as clear for mid-sized institutions. A potentially higher cost must be balanced against the clear advantage of campuswide distribution and the many other benefits of this license.

Additional Recommendations:

- Commit staff to manage the program.
- Discuss implementation details with schools in your immediate area.
- Evaluate competitive software vendors to see if they have comparable programs.

- Establish a collaborative relationship with your points of resale and libraries.
- Adapt your anti-piracy campaign.

We have been asked by the CIOs who chartered our consortium to leverage our experience and knowledge into additional software contracts. We are targeting virus protection, statistical analysis, and web tools. Time will also need to be allocated towards establishing a formal statement of process and how to improve it so that it scales for additional contract management.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0063

Title: Making Your Online Learning Environment a Success

Author: Philip D. Lyles and Carla Rathbone

Organization: Clemson University

Year: 2000

Abstract: A popular topic of discussion in higher education is the use of online learning environments. Regardless of the choice of locally developed or purchased, the real challenge is making it succeed. This session looks at how Clemson University is making its online environment useful and encouraging innovative uses.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0002

Title: One Size Does Not Fit All: Models for Support and Training Partnerships in Virginia

Author: Sue Ellen Breeden, Ellen Ramsey, Susan Evans, Gene Roche, and Michele Valliere

Organization: University of Virginia and College of William and Mary

Year: 2000

Abstract: Discusses training issues of two distinct support models. The University of Virginia model provides technical resources to staff who report directly to, and are funded by, individual departments. The College of William and Mary's central information technology unit funds liaisons who reside in the departments they serve.

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One Size Does Not Fit All:
Models for Support and Training Partnerships in Virginia

Sue Ellen Breeden, Ellen Ramsey
University of Virginia
Charlottesville, Virginia

Susan Evans, Gene Roche, Michele Valliere
College of William and Mary
Williamsburg, Virginia

Panelists will discuss training issues of two distinct support models. The University of Virginia model provides technical resources to staff who report directly to, and are funded by, individual departments. The College of William and Mary's central information technology unit funds liaisons who reside in the departments they serve.

Presentation Outline

All universities and colleges face unprecedented challenges in providing effective computing support and training to their communities. The University of Virginia (UVa) and the College of William and Mary (W&M) are successfully confronting these challenges, but in a strikingly different manner. The purpose of this panel is to explore the strengths and weaknesses of the two organizational models and consider the conditions under which each is appropriate.

Providing technical support to a large, geographically diverse population is a daunting task. IT organizations must contribute to the teaching and learning mission, while supporting complex and visible administrative operations. In this presentation, we will describe two distinct models and examine the role training has played in the overall effectiveness of each program. We'll explore the strengths each model brings to providing support and the challenges each faces to enhance communication and promote the exchange of knowledge. The panel will conclude with several case study scenarios, where we will discuss our programs' likely responses to common constituent needs.

Summary of Comments:
The University of Virginia (Sue Ellen Breeden and Ellen Ramsey)

The University has implemented a distributed support model in which departments hire their own technical support professionals, rather than request day-to-day technical support from the central IT department. By working in and reporting directly to academic or administrative departments, these individuals -- referred to as Local Support Partners (LSPs) -- become specialists in their particular computing environment and thereby increase their intrinsic value to the departments they serve.

The LSP Program is an alliance between the University's Information Technology and Communication (ITC) department and computing professionals serving departments throughout the University, and is an element of ITC's Departmental Computing Support Program. Through certification-directed training, high-level access to ITC resources and services, and regular liaison activities, Local Support Partners are provided with the tools critical for success in their departmental computing roles. ITC's Departmental Computing Support team and many other support resources of ITC are available to assist with information technology needs and problems as they arise within LSPs' departments. Monthly meetings are held for groups of LSPs with similar departmental concerns, with topics targeted to each group's training and support needs. Semi-annual LSP conferences provide a forum for information-sharing and training which applies to all LSPs. Two other important resources are in the form of certification programs which provide LSPs with training skills and additional staffing for technical support needs, described below.

Local Training Partner Program: LSPs who regularly train their departmental users are supported through the Local Training Partner (LTP) program, a network of professionals around the University whose responsibilities include technical training. LTPs complete certification through the "Training of Technical Trainers" Program. The LTP program began with LSPs, but has expanded to include others around the University who are tasked with technical training duties as part or all of their responsibilities.

Local Support Associate Program: LSPs in large departments find assistance for front-line technical support by educating existing staff through the Local Support Associate Program. While providing front-line computing support is, in theory, the responsibility of the LSP, they cannot always be the first point of contact when a problem arises. This is generally true in departments where LSPs support large numbers of users, and is also the case for departments that do not have LSPs. In both situations, users frequently turn to the staff members who are the most accessible --those across the hall or in the office next door--to resolve computer-related problems. To address this need, the Local Support Associate program was established. The Local Support Associate (LSA) program allows LSPs to identify and provide additional training to the users who assist them in day-to-day computing support. (ITC's Departmental Computing Support Team identifies LSA candidates in smaller departments that do not have funding for LSPs.) LSA candidates complete a certification program ("Computing Survival Skills") which consists of eighteen hours of training on base-level troubleshooting.

An new program which exemplifies the successful collaboration between local support personnel and central IT decisions is the Desktop Computing Initiative (DCI), a voluntary, University-wide program designed to curb the total cost of owning computers and to increase the efficiency and effectiveness of support for personal computing at the University. Goals of this program include easing the generic computing support burden and allowing a focus on a higher value support, improve sharing of electronic documents, fostering faculty-student collaboration and development of instructional materials, standardizing replacement cycles and the annual budget process, and reducing the use of out-of-date computers.

Summary of Comments:

The College of William and Mary (Gene Roche, Susan Evans and Michele Valliere)

The College of William and Mary leverages the benefits that distributed and centralized support models each have to offer in providing technology support and learning resources to its constituencies. We blend the right mix for the right solution.

For our academic departments, we have a model based upon a distributed 'specialty team' supported by several core teams. The 'specialty team' members are liaisons that report to Information Technology, but 'live day-to-day' with the academic department clusters they support. Although they are technically proficient, these individuals have advanced degrees in relevant disciplines and their priority is to provide the one-on-one support our faculty need to integrate the use of technology in the curriculum.

The liaisons also serve as the first point of contact for their departments when IT problems or needs arise. Core teams support this specialty team:

- **The IT Learning Team** performs learning needs assessments, defines desired learning outcomes, and deploys resources for different learning styles, including instructor-led workshops, and technology-based training.

- **The Technology Support Center (TSC)**, our help desk, tracks technical problems, dispatches hardware and software technicians, and maintains central on-line services such as web-based support and software repositories.

The liaisons perform 'triage,' escalating technical problems to the Technology Support Center, and technology competency needs to the Learning Team.

These core teams deploy campus-wide technology support services and respond to feedback from the liaisons identifying campus trends and needs. A recent example was the rollout of Blackboard Inc.'s CourseInfo, a web-based course management tool. Feedback from faculty and their liaisons indicated a growing need for on-line course support tools. A cross-functional team, consisting of learning consultants, software technicians, engineers, liaisons, and faculty, evaluated several tools in this category and selected CourseInfo for a pilot program. When this team decided to 'mainstream' this service after the pilot program, they developed a support plan that would provide the necessary centralized and distributed services, such as, the TSC providing server and account administration; the Learning Team providing workshops and on-line learning resources for the liaisons and their faculty, and the liaisons responding to the specific content development needs of their faculty.

Another example of this support model in action was our BEST (Building Enhanced Skills with Technology) pilot program, developed to complement a new equipment leasing program, which would provide several hundred new computers with new operating systems and software suites to our faculty. Just as UVa developed the "Computing Survival Skills" Program to respond to a computing support need, we developed the BEST program to address faculty support issues. We recognized the faculty support role the office staff in the academic departments often have to fulfill. The Learning Team worked with the liaisons, department chairs and staff representatives to develop a technology competency program that would enable the staff to assist the liaisons in providing competent, efficient faculty support.

A final example is a Faculty Institute designed for professors in our School of Education. Working with the departmental liaison and a School of Education faculty member, the IT Learning Team developed a program for faculty in the teacher education curriculum. This Institute offered sessions designed to establish a level of computer competency among faculty.

Currently our administrative departments are supported centrally through our core teams, but a similar model will be put in place as part of our enterprise resource planning project.

Scenarios

1. Database conversion

Doug is a technical support professional for the History department. About a year ago, Doug designed a Paradox database for a faculty member's research data. For the past 12 months, a graduate research assistant has entered and manipulated data for the research project. Now, a collaborator at another university is insisting that the database be converted to Microsoft Access. Doug has never used Microsoft Access.

The University of Virginia: As part of the LSP program, Doug could post a request for help to email lists on which LSPs actively participate, and also to a database special interest group made up of LSPs and ITC staff. In addition, for answers to more complex conversion issues, he can take advantage of the locally installed version of Microsoft Technet provided as an LSP resource. In addition to these special services for LSPs, there are several other resources available to all members of the UVa community. The Help Desk is one place to turn, and if Doug's question could not be answered there, it would be referred to the Desktop Computing Group, which has staff with database experience. On behalf of his faculty member, Doug could contact Robertson Media Center, which provides many types of support for faculty seeking to integrate technology into their teaching. Another faculty resource is the Research Computing Center, which provides help to faculty seeking to integrate technology into their research. As a long-term solution that would also benefit Doug's professional development, ITC also offers instructor led workshops on Fundamental through Advanced Access.

The College of William and Mary: Since all academic departments at the College of William and Mary have Departmental Liaisons, Doug will contact that person for assistance in converting his Paradox Database to MS Access. After a consultation, the Departmental Liaison will schedule as many sessions as needed to successfully convert to MS Access. If the Liaison is not proficient in using the MS Access software or has never done a conversion from Paradox to Access, the IT Learning Team will provide the second line of support to convert the data, using the conversion as a learning experience for the Liaison. This way the data will be converted by an experienced person, the Liaison will receive training for database conversions, and the College will be able to collaborate with another university.

Since the Administrative Departments do not currently have Departmental Liaisons, they will call the Technology Support Center (TSC). The TSC will open a Remedy ticket and assign it to the IT Learning Team to provide the second line of support to convert the data. As the TSC acquires more staff with database conversion skills, they will be less reliant on the Learning Team for administrative support issues.

2. Rollout of Windows 2000

The benefits of Windows 2000 have been widely publicized and faculty, staff and students are asking when conversion to the new operating system will take place.

The University of Virginia: Cross-divisional Projects (CDPs) are designed to test new services in various environments, assess costs and services, impact on the user community, risks to the user community, and design plans for maintenance. The Windows 2000 CDP has been created to answer just such issues raised by conversion to this new operating system. As the central computing organization, ITC is not necessarily the first to go to a new operating system--other pockets of the University have probably moved earlier. We ask LSPs from those cutting edge departments to participate on the CDP even though their problems deploying to a small group are somewhat different than a whole-University deployment. Various groups within ITC are also represented on the CDP. To date, the Windows 2000 CDP has identified issues with the rollout, and has provided education and resources to technical professionals and users on implementation, marketing, and advantages/disadvantages of installation and use of the new operating system. Training sponsored by the CDP has taken the form of knowledge exchanges, brown bags, demonstrations, vendor presentations, and recommendations for outside workshops. ITC also offers our user community a no-cost, pre-configured Windows 2000 desktop build that is configured to work securely in our network environment.

The College of William and Mary: Information Technology had already devoted a significant amount of effort to establish and broaden the scope and service of a Windows NT networking structure. We determined that our faculty are using the tools and support resources to make a difference with technology, our staff is more productive and proficient, and our students have come to expect the benefits of the latest technology. To deploy the new operating system, IT created the Windows 2000 Cross-Functional Project Team. The team immediately identified Windows 2000 "testers" throughout the campus. These testers were given a brief orientation to the new operating system after their install and asked to attend a meeting one week after install to discuss any issues that may have arisen. Next, documentation was created and linked to the IT Learning web site to inform the community of what to expect with this new operating system. The date was set for William and Mary to start using Windows 2000 Professional, which included stating that it would be the preferred operating system at William and Mary. The launch was then coordinated through the project team and benefits to the community were publicized. Following that, configuration standards were defined, including application locations and configurations which included making sure that it would be the operating system for the leased computers. Next we offered a discount on upgrades within three months after the start implementation date and required all upgrades after the three month cut off to be Windows 2000. Finally the team upgraded faculty and staff desktops in the order decided by the project team.

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3. Student with a bad disk

It is 8:30 a.m., and Jen is completing a term paper. She has been working in a student computer lab since 10:00 p.m. the night before. She has saved the 25 page thesis onto a floppy disk and is now headed to her 9:00 a.m. class. After class, she returns to the lab and attempts to print her paper from the floppy disk. She gets a message that her disk is unreadable. The paper is due at the beginning of her 1:00 p.m. class that day.

The University of Virginia: The Help Desk is first place for this student to go, and the problem would be addressed, not referred, since the paper is due at 1pm. However, if Jen had already returned to the lab, the lab consultant on duty would be the first point of contact. The lab consultant would attempt to help, then refer her to Help Desk, (or call the Help Desk for the student) if the lab did not have the utilities necessary. Whether it is the lab consultant or Help Desk staff who ultimately solve the problem, the staff helping the student would also educate her on the need for creating backups and also the availability of more secure storage on our Home Directory Service.

The College of William and Mary: Jen will go to the College's full-service Technology Support Center (the TSC) for assistance with her bad disk. To benefit students and faculty, the TSC has expanded service hours, and is usually open until 11:00 p.m. Understanding that Jen has a 1:00 p.m. deadline, TSC staff would immediately scan and attempt to repair the disk using specialized utilities software. Staff at the TSC will also make sure that Jen is informed about network space that is accessible for all students in the computer labs.

4. Faculty member wants to use PowerPoint

Although a little skeptical about technology, Professor Clarke thinks her teaching might be enhanced by using PowerPoint during her lectures. She has never used PowerPoint and has asked her department's technical support professional, Betsy, about the logistics of getting a computer and projector into a classroom.

The University of Virginia: ITC's Labs & Classrooms group is the first stop to request portable equipment for each class that needs equipment. Betsy as an LSP also has access to check out a laptop and projector so that Professor Clarke can get familiar with the equipment and software. Long-term, the Professor Clarke could request to use a technology-equipped classroom, or could request that her regularly assigned classroom be transformed into a technology-equipped classroom (through the Provost). If they are in a participating department, Betsy can enlist the support of the department's Teaching and Technology Support Professional (TTSP) to get Professor Clarke up to speed on PowerPoint. Another resource is the Robertson Media Center, which is designed to provide assistance to faculty for requests to integrate technology with instruction. If department has an LTP or LSA, Betsy can point Professor Clarke to them for training/tutoring in PowerPoint. Another resource for training in PowerPoint for Professor Clarke might be the joint faculty training initiative currently being pursued by the library and ITC. ITC also offers instructor led workshops on PowerPoint, although they are more popular with staff than faculty.

The College of William and Mary: Located within the academic departments they serve, Departmental Liaisons are experts at integrating technology into the classroom and Professor Clarke will talk with her liaison about her desire to use PowerPoint. A liaison has knowledge of the disciplines in various academic departments and will also be able to recommend ways to use presentation software to enhance teaching and learning. Further, the liaison will have access to all of the resources Professor Clarke will need to be successful. First, the liaison might offer to help a faculty member enroll in a PowerPoint workshop offered by the Learning Team. Next, the liaison will consult with Professor Clarke about the particular curriculum and the opportunities presented for using PowerPoint. Finally, the liaison will either secure a technology enhanced classroom or the computer and projection equipment needed.

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0036
Title:	A Catalyst for Collaboration: Supporting Technology in Teaching through Partnerships
Author:	Mark Always, Tom Lewis, and Scott Macklin
Organization:	University of Washington
Year:	2000
Abstract:	The Web-based Catalyst Initiative was created at the University of Washington (UW) to support innovation in teaching through technology. The approach utilizes participatory design techniques in the development of next generation technologies in order to scale beyond early to second wave adopters. Catalyst is the product of a support strategy that has centered on collaborative partnerships with campus teaching practitioners -- learning, technology, and teaching research centers, libraries, and departments -- to leverage resources and spread promising practices throughout the university.

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A Catalyst for Collaboration:
Supporting Technology in Teaching through Partnerships

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Abstract

The Web-based Catalyst Initiative was created at the University of Washington (UW) to support innovation in teaching through technology. The approach utilizes participatory design techniques in the development of next generation technologies in order to scale beyond early to second wave adopters. Catalyst is the product of a support strategy that has centered on collaborative partnerships with campus teaching practitioners—learning, technology, and teaching research centers, libraries, and departments—to leverage resources and spread promising practices throughout the university.

Introduction

By now all institutions of higher education are grappling with instructional technologies, in part spurred by the explosive growth of Internet technologies in everyday life. To support technology in teaching, many campuses have established a faculty technology center, offered training to interested educators, supported faculty technology projects and the transformation of particular courses, and/or implemented off-the-shelf courseware. These efforts have generally targeted *early adopters* who are eager and willing to teach themselves how to use and implement new technologies. Most support staff, however, now face the challenge of moving beyond the small core of *early adopters* to the *wary adopters*, the vast majority of faculty who look for easy ways to bring technology into their teaching but are unwilling to match the time commitment of the pioneers.

As noted in a recent National Learning Infrastructure Initiative white paper,[1] this second wave of *wary adopters* shares a commitment to quality learning with the *early adopters* but is much more risk averse and unwilling to experiment or invest significant amounts of time to integrate technology. Moreover, there is no magic-bullet solution that will meet the needs of all or even most *wary adopters*. To reach its own second wave of *wary adopters*, the University of Washington chose to forego courseware or unitary solutions in favor of a support strategy, the Catalyst Initiative, grounded in partnerships and collaboration with campus teaching practitioners—learning, technology, and teaching research centers, libraries, and departments. This strategy leverages and scales the ideas and developments of many different innovators and support staff, allowing faculty to pick and choose technologies and support options that suite their particular needs from a much more rich and diverse palette of resources.

Just 18 months old, the Catalyst Web site is widely used by UW faculty. On an average fall day, approximately 600 instructors use the original content on Catalyst to help them integrate technology with their teaching. Over 1350 instructors have created 3416 implementations of Catalyst Web tools; and this fall, more than 700 students use Catalyst Web tools every day as a part of some learning activity. Clearly, the Catalyst Initiative has helped reach the *wary adopters*. This paper discusses the origins and work process behind the Catalyst Initiative, taking care to emphasize elements of the support strategy that obtain beyond the University of Washington.

Partnerships as a Support Strategy

In 1994, three top-level administrators at the University of Washington were charged by the Provost to "do something about technology." They redirected resources from their respective units and worked with faculty to launch a small pilot project to provide 65 freshmen with laptops and training in technology and information literacy. Collaborating with other faculty, librarians, technologists, and students, they quickly moved beyond this initial pilot, rounding up more partners and gathering resources from wherever they could to focus on bringing technology into the service of teaching and learning in a more systematic way through the Center for Teaching, Learning and Technology (CTLT), established in 1996.

The CTLT served as a drop-in center where faculty could work and receive one-to-one assistance in a uniform and familiar environment of standard software and hardware. The Center tailored custom solutions to faculty needs, often working closely with support staff from a client's home department. Staff also gave frequent workshops on basic applications and technology skills. This support model required significant staff time and creating the expectation of continued, intensive support (for relatively few clients). By 1998, drop-in visits to the CTLT had increased dramatically, seriously taxing staff resources. At the same time, however, the absolute number of instructors assisted by CTLT staff was relatively small, a few hundred *early adopters* over the course of the academic year. The need to expand support to a much wider audience—and to do so without a major infusion of new staff or relocation to a larger facility—was clear. How to do so was not.

At this point, staff entered into an intense period of assessment and wide ranging conversations with the major partners behind the CTLT, campus stakeholders, faculty focus groups, and campus support staff.[2] What emerged from these conversations was a clear set of requirements for supporting *wary adopters*: (1) the initial foray into educational technology must be smooth and easy; (2) flexibility is critical to meet the both the changing needs of instructors as well as evolving technologies; and (3) campus-wide, scalable resources are a must. Not only did these conversations forge a consensus among campus educators about what needed to be done, but the new support framework that resulted—the Catalyst Initiative—explicitly met the needs expressed by faculty, librarians, instructors, and teaching assistants.

> **Lessons Learned:** Among the early collaborators supporting educational technology were the Office of Undergraduate Education, the University Libraries, the Office of the Provost, Computing and Communications, and a number of faculty drawn from many disciplines. Later, the Office of Educational Partnerships, Educational Outreach, and the Office of Educational Assessment joined the mix. What has proven critical to UW's success in supporting educational technology is that all the units that should have been shaping technology integration were shaping technology integration. The initial partnership established an ethos of multi-unit, results-oriented collaboration that has persisted. This has produced a support strategy owned by all the players, avoiding the tensions inherent in top-down mandates for integration and bottom-up demands support.

Scaling Innovation through the Catalyst Initiative

The concept was simple: provide examples, promote good teaching practices, build technology skills, and make technology easy for instructors to use. These are the tenets of the three-tiered Catalyst Initiative, a support framework that provides anytime-anywhere resources via the Catalyst Web site.[3] Catalyst places good teaching and student learning at the forefront, treating technology as a means to these ends. The resources on the Catalyst Web site shape and inform the other two tiers of the Catalyst Initiative: redesigned workshops and one-on-one consulting delivered through the CTLT. This interlocking support strategy ensures that campus educators receive clear, consistent help for integrating technology into their teaching.

A great deal has been written about the creation of the Catalyst Web site,[4] but it is worth reemphasizing here that its homegrown content is built solely through collaborative partnerships with campus teaching practitioners—learning, technology, and teaching research centers, libraries, departments, and faculty. A look at the six major content categories on Catalyst makes clear the close connections to campus practitioners:

- *Profiles* tell the stories of educators who are using technology in teaching—the challenges they face, the pitfalls they encounter, and the successes they achieve. This section allows faculty who use technology to share what they are learning and doing with their colleagues from across campus, breaking through traditional disciplinary boundaries.

- *Teaching* lets instructors explore the ways that technology can help achieve specific teaching and learning goals. These pages were created input from teaching research centers and point faculty to these centers.

- *Action Plans* are "road maps" for particular tasks, such as creating a class web site or setting up electronic discussion. Many of these draw on existing campus computing resources or rely on information gathered from technology centers.

- *How-to* pages take users step-by-step through specific tasks needed to make technology work. The range of applications covered here mirrors the range of applications available in the many different computing environments throughout UW. Indeed, numerous *How-to* documents were created in collaboration with department of unit support staff.

- *Learning* offers information on CTLT workshops and other campus activities related to teaching with technology.

- *Web Tools* (discussed in detail below) is a gateway to Web-based software and also links to innovative uses of Catalyst Web tools by UW educators, again helping to spread good practice beyond disciplinary boundaries.

These resources easily meet the three requirements for supporting *wary adopters*. First, the varied stories of teaching with technology, the step-by-step instructions, and the best practices make an educator's initial foray into educational technology smooth and easy. Second, Catalyst is extremely flexible; faculty needs and wants vary markedly across departments, disciplines, and course types, but Catalyst allows them to pick and choose support options that suite their environment and needs. Finally, Catalyst is a campus-wide resource, available 24-7, which scales local solutions throughout the campus teaching community.

> **Lessons Learned:** Excellent support resources and exciting teaching practices using technology are found all across campus. Very few people, however, have knowledge of resources and practices beyond their own departments. The Catalyst Initiative was created exactly to make these resources and practices visible, scaling innovation across campus through collaborative partnerships. Not only does this strategy leverage resources, but it also forges both a sense of ownership and a measure of comfort with educational technology among faculty and support staff who come to see themselves in the offerings on Catalyst.

Participatory Design & Catalyst Web Tools

Since early 1996, the CTLT had worked one-on-one with *early adopters* to create interactive, Web-based course material. This approach, while time consuming, worked well when dealing with a few highly motivated instructors. Faculty demand, however, quickly overwhelmed developer supply, yet the tools were not moving beyond *the early adopters*. Still, most of the functionality requested by faculty was similar in nature—a few simple modifications to an existing program made it work for another instructor—a hopeful condition for producing easy to use, flexible, and scalable Web-based applications.

Refocused development efforts settled on two guiding principles: (1) most instructors know what they want from technology and have great ideas about how they want to use it, especially if they are given a bit of help; and (2) instructors should be able to "use" technology, i.e., easily configure and customize it from wherever they do their computing. Thus began a development model rooted in participatory design to create Web-based applications that meet general instructional needs shared by *early* and *wary adopters*, not just the specific needs of *early adopters*.

The first principle is truly the key to the success of Catalyst Web Tools[5]. Instructors really do know what they want from technology, and in keeping with the ethos of multi-unit, results-oriented collaboration that has marked UW technology support efforts, faculty from across campus have been integral to the design process. The first step in the Web Tools development cycle is to meet with instructors both formally in needs assessment groups and casually as they work in the CTLT. Individual instructors regularly come to the CTLT with an idea in mind or a project to complete that they wish to discuss with staff. Developers then work with other instructors to see if the need is widespread and transform the individual needs into a cross campus educational solution.

In a world where off-the-shelf software solutions are often developed simply to take advantage of a new technology, Catalyst developers are more concerned with building tools that instructors need, not with tools that reflect the latest and greatest trends. Faculty typically have specific needs and ideas about how to integrate technology, and their reasons for wanting to use technology in lieu of other teaching methods are generally well-formed. Consultation with instructors lets staff focus on core pedagogical goals before considering technological solutions.

Once a decision is made to develop a particular Web Tool, usability studies commence. Interested instructors are invited to review the designs and screen mock-ups as if they were using the tool, and staff closely monitors participants as they walk through the screens. Without fail, the usability studies uncover issues concerning terminology, process, and features that developers had not anticipated. Through this intensive needs assessment and usability testing process, instructors become participants in the design, assist in determining product features, and specify functionality, leading to Web Tools that really are a by-product of collaboration.

Mindful of the risk averse *wary adopters*, Catalyst Web Tools have a user interface which lets both *early* and *wary adopters* use the technology while retaining control of it. With its limited set of simple interface elements—a series of HTML forms—the software is easy to learn, configure, and use. In fact, the set-up process is a lot like shopping online. Developers error on the side of a reduced feature set for improved usability and simplicity, yet the Web Tools still provide as many options as possible to leave the instructor in full control. Moreover, because the applications are accessed via the Web by both faculty and students, users can count on a consistent interface and functionality no matter the platform (Macintosh, Windows, Unix, etc.) and no matter the browser (Internet Explorer, Netscape, Opera, etc.).

With the Web as the medium for Catalyst Tools, developers have worked in partnership with Computing and Communications (C&C) to maintain a centrally hosted code base on systems maintained by C&C staff. This means there is no need for instructors to fiddle with downloading, installing, and configuring software on their own machines. The software is in essence transparent to the user and accessed simply by going to a specific URL, another plus for *wary adopters*. This model is extremely flexible and scalable, making Catalyst Tools available both on campus and off, allowing instructors and students to work from home, the office, or even a remote site while traveling.

Finally, it should be noted that the development cycle for a particular Catalyst Tool never closes; new ideas and suggestions arrive daily from the Catalyst Email Help-line or from clients who drop into the CTLT. Developers also teach Catalyst Tools workshops, which serve as an invaluable source of instructor perspectives. Significant feedback also comes from collaboration with the Technical Communication Department. Their graduate course in usability testing has tested several Catalyst Web Tools and the Web site itself. The recommendations from these usability classes have been extremely valuable. This ongoing feedback ensures that Catalyst Web Tools retain their pedagogical utility and flexibility to meet campus-wide teaching needs.

> **Lessons Learned:** Focusing on pedagogical needs expressed by numerous faculty and developing software to meet these needs, Catalyst developers create applications with an instant market that meet very specific teaching needs on campus. With their low entry costs and collaborative origins, these are tools of and by *wary adopters* and thus scale easily. The constant consultation with users and many feedback channels guarantee that the tools remain current and easy to use, avoiding some of the problems posed by static off-the-shelf software solutions.

Building Catalyst through Co-Branding

Last February, the Catalyst Initiative celebrated its first anniversary, having survived initial growing pains to produce some very formidable gains in campus technology support.[6] Re-christened the Educational Technology Development Group, the staff responsible for Catalyst was now ready to make use of use the results-oriented, multi-unit collaborative ethos critical to the formation of Catalyst to help grow the initiative. Co-branding efforts focused on formalizing existing but piecemeal partnerships with campus teaching practitioners—learning, technology, and teaching research centers, libraries, departments, and faculty—to generate new ideas, content, and tools for the Catalyst Web site. Resources and materials generated from these partnerships are placed on Catalyst and co-branded, giving credit to the partners who helped create them.

Co-branding allows staff to maintain current and innovative resources on Catalyst, while alleviating the burden of generating new materials whole cloth. Among the most notable results of these co-branding partnerships are:

- *MyClass:* C&C has recently created *MyUW*, a personalized Web portal for UW students and is working on portals to meet the needs of each segment of the UW community. C&C is currently working with the Ed-Tech Development Group to create *MyClass*, the personalized teaching portal for UW instructors. This portal will integrate Catalyst Tools with course and student information systems, online grading capabilities, and applications that let instructors post content directly to the Web. In part, *MyClass* is designed to reach *wary adopters*, bringing useful Web-based course administration tools together with a simple interface for creating online course materials.

- *CONTENT*: With its Digital Initiatives Program, UW Libraries is building an online multimedia collection that showcases print, photograph and textual materials through the *CONTENT* digital asset management system developed at UW's Center for Information Systems Optimization (CISO). Librarians, working with scholars who wish to digitize their own materials, design the individual *CONTENT* databases within the Digital Initiatives collection. The CTLT now houses two *CONTENT* digitization and acquisition stations, and the Ed-Tech Development Group is working with CISO staff to create instructions and support materials which, once housed on Catalyst, will permit faculty to create *CONTENT* databases themselves.

- *Task Consultant*: This Catalyst Web Tool, currently being co-developed with the School of Library and Information Science (SLIS), meets a need frequently voiced by faculty—how to guide students in the formation of research papers and projects. Building on a core strength of the SLIS program, models for information problem solving, the interactive *Task Consultant* will help students sharpen research topics, structure arguments, determine appropriate levels bibliographic information, and create a project timelines.

- *Turning Your Course into an Online Course*: This new workshop series, co-developed with Educational Outreach, aims to help faculty create courses that have distance-learning or online components. After the first series of workshop materials, Ed-Tech Development staff will transform workshop materials into new Catalyst content, making these resources available to all instructors.

Not only do these partnerships lead to new Catalyst resources and Web Tools, but they also scale resources that might otherwise remain underutilized, like *CONTENT*, or spark exciting new campus-wide developments in educational technology such as *MyClass*.

> **Lessons Learned:** Anytime-anywhere support resources must be renewed and refreshed to keep pace with changing faculty needs and new technologies. Charging one unit, in this case the Ed-Tech Development Group, with uncovering, capturing, and disseminating innovation has proven essential to accomplishing this end at UW. Yet the success of co-branding owes a great deal to the founding partners behind the CTLT and Catalyst. The fact that all the units that should have been shaping technology integration were shaping technology integration sets an expectation that teaching practitioners should continue to collaborate on Catalyst, and their willingness to do so is further buttressed by giving credit where credit is due on the Web site itself.

Co-Branding with the Program for Educational Transformation through Technology

To bring together the practice of educational technology with the science of teaching and learning, Catalyst partners with the Program for Educational Transformation through Technology (PETTT).[7] The primary goal of PETTT is to enhance the effectiveness of teaching and learning at UW by promoting, assessing, and disseminating effective uses of technology, paying careful attention to exemplar projects. This goal is predicated upon one observation: many faculty wish to utilize technology in education, but the effort necessary to integrate is often prohibitive because there is so little information about how to change pedagogical practices to incorporate new technologies or about the effectiveness of doing so.

PETTT addresses this information gap through research and development efforts carried out in the context of exemplar projects. Two exemplar projects in particular that will feed content to Catalyst are the Arthritis Source and the Computer Science and Engineering (CSE) Tutored Video Instruction Pilot (TVI) projects, representing informational Web sites and multimedia-enhanced distance education, respectively. Working with exemplars, PETTT avoids the often-lengthy period associated with the initial design and debugging of new technologies by assisting with development. Moreover, because the exemplars are developed by UW educators, they fit within the constraints and particularities of the UW educational environment and thus scale much more readily.

By working with the Arthritis Source exemplar, for instance, PETTT has developed an information design format for educational materials that can be disseminated on the web, in the classroom, or through informational brochures. This format treats different components of the materials as elements of a database, which facilitates indexing, editing, and access using a wide variety of devices, such as personal digital assistants, personal computers, and soon digital phones. Additionally, By working with the CSE-TVI pilot project, PETTT has identified both specific uses of video technology that promote learning and productive interactions between students and teachers as well as specific impediments to learning not otherwise obvious to the instructors. As a result, we have created recommendations for training small group facilitators who work with tutored video instruction and for redesigning video-based instructional materials.

Each of these models for teaching with technology is extremely scalable and thus suitable for dissemination via the Catalyst Web site. Among the teaching and learning guides for Catalyst that have been crafted from these two projects and from PETTT's other research activities are:

- *Conducting a Log file Analysis*, a guide that synthesizes literature on log file analysis, presents information on a variety of analysis tools, and gives recommendations about how to use the results of a log file analysis.

- *Conducting an Online Survey* proposes guidelines for designing on-line surveys that characterize Web site users and effectiveness. This guide will also contain pointers about the overall design process, expectations for time requirements, and information about possible outcomes.

- *Learning about an Educational Technology by Interviewing the Designer* describes the possible outcomes of interviewing educational technology designers, potential questions to ask during an interview, and various aspects of designing and analyzing an interview.

- *Effective Facilitation of Online Discussions*, a guide for increasing student interaction using Web tools such as Catalyst's Epost.

- *Authoring and Presenting Streaming Video* details the process of creating, capturing, editing, and streaming video and multimedia via the Web utilizing.

In the near future, PETTT will also concentrate its research efforts on effective uses of Catalyst Web Tools, generating insight that will surely prove invaluable to the developers.

> **Lessons Learned:** For campus-wide integration to be truly successful, the evolution of educational technology must be coupled with the evolution of educational practice and educational science, informing one another in a continuous cycle. The Catalyst Initiative is fortunate to share a close relationship with PETTT that provides for this continuous cycle, leading to rich Catalyst content on how to incorporate educational technologies into pedagogical practices and the effectiveness of doing so—two resources that are very important to *wary adopters*.

Extending Integration through Outreach

To reach instructors who do not know about Catalyst or who do not teach with technology and to keep current Catalyst users informed about new developments, Ed-Tech

Development staff engage in extensive outreach activities. These activities are essentially marketing efforts, some very general but most carefully targeted. The most general marketing tool is the *CTLT Teaching with Technology Workshops* brochure mailed to all instructors and teaching-related staff on campus. Ed-Tech Development staff teach a series of approximately ten free workshops five times per year, providing five opportunities to send out a new brochure. Each brochure, while written to sell the workshops, also refers back to the resources on the Catalyst Web site and the face-to-face help available in the CTLT, bringing together the three tiers of the Catalyst Initiative.

Staff also targets different groups with personalized letters and frequently updated promotional materials approximately four times per year. To reach the faculty leaders, letters go to Deans, Department Chairs, and members of Faculty Councils that deal with teaching or technology broadly. Next, we target the people who support instructors, like departmental technology support staff, teaching and research assistants, and librarians. Finally, we send letters to everyone who has visited the CTLT, taken a Catalyst workshop, or signed up for the Catalyst listserv. Every letter has three parts: (1) a general message announcing new Catalyst content, Web Tools, or special initiatives such as our current focus on streaming media, (2) a description of the three tiers of support available through the Catalyst Initiative, and (3) an offer to provide specialized workshops or presentations. These letters have had a very positive impact, creating a buzz about the Catalyst Initiative, leading to suggestions or ideas for new Catalyst content, and generating numerous requests for workshops or presentations. Indeed, this fall staff members have given over thirty specialized workshops or presentations to different units and groups, reaching approximately 500 people.

The most granular outreach efforts extend to very specific groups of faculty. Many of our practitioner partners who deal with faculty on a face-to-face basis, especially the learning, technology, and teaching research centers co-branded on the Catalyst Web site, refer their clients to Catalyst resources when appropriate. Ed-Tech Development staff also work closely with two programs coordinated by the Office of Undergraduate Education: The Institute for Teaching Excellence and the Collegium for Large Lecture Courses. These programs help faculty develop new curriculum and pedagogical strategies, and technology usually plays a substantial role in the revamped curriculum. Ed-tech staff can work with these faculty to think through the process of technology integration as these faculty build their courses anew. Finally, staff are beginning to assist faculty teaching large, introductory courses who wish to integrate technology. This fall, for example, the Ed-tech Development Group has helped faculty teaching courses in Physics, Communications, and Speech Communication, courses that reach hundreds of students, to integrate Catalyst Web Tools into the course design.

> **Lessons Learned:** Simply providing good resources for faculty who wish to teach with technology is not enough. To reach *wary adopters*, support staff must evangelize, reaching out not only faculty but also those who support faculty. The Catalyst Initiative keeps growing exactly because staff are constantly getting the word out to new users and repeating the message to established users.

Conclusion

Ed-Tech Development staff are acutely aware that the Catalyst Initiative is not the be-all, end-all solution for reaching *wary adopters*. In fact, the beauty of the strategy behind the Catalyst Initiative is that it assumes no finality. Through its origins in partnerships and near constant collaboration, the Catalyst Initiative is and will always be a work-in-progress to reach UW's *wary* *adopters*. If there is anything that observers can take away from UW's experiences, it is likely to be found in these lessons:

- Make sure that all the units that should be shaping technology integration are shaping integration.
- Scale support through collaborative partnerships, making disparate resources and innovative practices visible and available to all.
- Create tools that meet pedagogical needs expressed by faculty and constantly engage with faculty to make sure the tools remain current and easy to use.
- Renew and refresh anytime-anywhere technology support resources by co-branding and co-developing them with campus teaching practitioners.
- Provide instructors with direction in how to effectively incorporate educational technologies into pedagogical practices.
- Evangelize and reach out to instructors in as many ways and as often as possible.

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[1] Paul Hagner, 2000. *Interesting Practices and Best Systems in Faculty Engagement and Support.* http://www.educause.edu/nlii/meetings/nliifs03/bestpract.pdf

[2] For a detailed explanation of this period see: Mark Donovan & Scott Macklin, 1998. *One Size Doesn't Fit All: Designing Scaleable, Client-Centered Support for Technology in Teaching.* Paper presented at Cause98: The Networked Academy in Seattle. http://www.educause.edu/ir/library/html/cnc9846/cnc9846.html

[3] http://www.catalyst.washington.edu

[4] Mark Donovan & Scott Macklin, 1999. *The Catalyst Project: Supporting Faculty Uses of the Web with the Web.* Cause/Effect 22(#3). http://www.educause.edu/ir/library/html/cem9934.html Mark Donovan, 1999. *Rethinking Faculty Support.* Technology Source (September/October). http://horizon.unc.edu/TS/development/1999-09.asp

[5] Currently, the Catalyst Web Tools suite consists of: E-submit—an electronic turn-in tool, WebQ—an online survey generator, Peer Review—an online collaboration tool, UMail—an anonymous email feedback tool, iSubscribe—a Web-based subscription form for listprocs, Epost—an online, threaded discussion board, and Catalyst Course Templates which allow instructors to easily create course Web pages. Planned for release during the next year are problem based learning tool, a significant upgrade to WebQ, and data collection and analysis software to facilitate group work on data outside of class time. To see the Catalyst Web Tools, visit: http://www.catalyst.washington.edu/catalyst/tools/

[6] The first-year results of the Catalyst Initiative are detailed in the Catalyst Report 2000: http://depts.washington.edu/catalyst/2000_report.pdf

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[7] To learn more about PETTT, visit http://depts.washington.edu/pettt/ and read the first Annual Report.

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0017

Title: Beyond Early Adopter to Full Integration of Technology in the Curriculum

Author: Mollie McGill, Fran Bagenal, Barbara Buttenfield, and Rick Forsman

Organization: University of Colorado System, University of Colorado at Boulder, UC Health Sciences

Year: 2000

Abstract: The core business of higher education -- teaching, scholarship and research -- is grounded in academic units (departments, schools and colleges) and is provided by a single resource -- the faculty. Direct faculty involvement will determine institutions' success in offering appropriate technology-enhanced learning experiences to students and in managing the ever growing needs for infrastructure, resources and support. "Achieving Unit Level Vision and Commitment" was implemented by the University of Colorado to encourage academic units to undertake a systematic planning process that will stimulate several outcomes: the engagement of more faculty, opportunities for collaborative development and use of technology-based learning resources, a coherent plan for determining the appropriate fit of technology within the overall curriculum, and recognition of the needed equipment, support and training resources to support faculty and students. One anticipated byproduct is that units will better understand the "total cost of ownership" of a technology-enhanced curriculum.

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"Beyond Early Adopter to Full Integration of Technology in the Curriculum"

A Panel Presentation from the University of Colorado System

Mollie McGill, University of Colorado System, Boulder, CO
Fran Bagenal, University of Colorado at Boulder
Barbara Buttenfield, University of Colorado at Boulder
Rick Forsman, University of Colorado Health Sciences Center, Denver, CO

The core business of higher education —teaching, scholarship and research—is grounded in academic units (departments, schools and colleges) and is provided by a single resource—the faculty. Direct faculty involvement will determine institutions' success in offering appropriate technology-enhanced learning experiences to students and in managing the ever growing needs for infrastructure, resources and support. "Achieving Unit Level Vision and Commitment" was implemented by the University of Colorado to encourage academic units to undertake a systematic planning process that will stimulate several outcomes: the engagement of more faculty, opportunities for collaborative development and use of technology-based learning resources, a coherent plan for determining the appropriate fit of technology within the overall curriculum, and recognition of the needed equipment, support and training resources to support faculty and students. One anticipated byproduct is that units will better understand the "total cost of ownership" of a technology-enhanced curriculum.

Achieving Unit Level Vision and Commitment to Technology

Mollie McGill, Office of Technology and Learning Innovations
University of Colorado System

Since 1995, the University of Colorado has invested special funding in one-time, pilot projects to encourage faculty use of technology in teaching, learning and research. These pilot efforts, while successful as independent course activities, are at risk since they lack any unit-wide support or shared use by other faculty within the unit. Moreover, the independent nature of these "pilot" efforts do not ensure that all CU students will have opportunities to develop important skills and knowledge of technology.

In 1999, the University of Colorado System Office issued a challenge to its four campuses to identify units (departments, schools, colleges) willing to undertake a systematic planning process to integrate technology into the curriculum. Ten projects were selected to participate in the "Achieving Unit-Level Vision and Commitment to Technology" initiative (http://www.cu.edu/VPAAR/6.technology/techinitiatives/unitlevel/index.html). The ten projects are spread across CU's four campuses (Boulder, Colorado Springs, Denver, Health Sciences Center) and across disciplines (medicine, geography, linguistics, astrophysical and planetary sciences, physics, sociology, languages and cultures).

The focus of the initiative is to encourage academic units (departments, schools, colleges) to undertake a systematic planning process to integrate technology into the curriculum. It is intended that this unit-level approach will stimulate several outcomes, including the engagement of more faculty, opportunities for collaborative development and use of technology-based learning resources, a coherent plan for determining the appropriate fit of technology within the overall curriculum, and recognition of the needed equipment, support and training resources to support faculty and students.

One anticipated byproduct is that units will better understand the "total cost of ownership" of a technology-enhanced curriculum, including the needed resources to sustain new technology-based approaches to teaching and learning. Campuses and the System Office will be better informed about future information technology infrastructure and services needed to support academic programs.

For the Educause Annual Conference, a faculty panel representing three of the pilot projects – ***School of Medicine, Astrophysical and Planetary Sciences, and Geography*** -- will discuss how this strategic, unit-wide approach will impact student learning, faculty roles and relationships, technology acquisition decisions, training and faculty development needs, and campus-wide IT planning.

Promoting Integration of Informatics Competencies across the School of Medicine Curriculum

Rick Forsman, Director, Dennison Library
University of Colorado Health Sciences Center

The University of Colorado Health Sciences Center's (UCHSC) School of Medicine has taken strategic steps toward adopting a new view of learning by infusing information technology and related skills into its entire curriculum. In 1998 the Association of American Medical Colleges (AAMC) released a set of suggested informatics competencies that will be essential to the future practice of medicine. Based on recommendations from an internal ad hoc committee, UCHSC's medical school reorganized its large curriculum committee, creating a permanent informatics subcommittee aimed at fostering adoption of the AAMC competencies. This subcommittee has focused on identifying and addressing issues that hinder faculty in embracing information technology in their teaching. Using seed funding from the President's Office, the subcommittee is implementing a variety of methods to accelerate the incorporation of information management skills into the full breadth of the curriculum.

In seeking to educate physicians who can practice within an environment replete with and dependent upon advanced information technologies, the School of Medicine is pushing forward on a range of **key issues**, including the following:

1. The underlying goals of the entire curriculum must be updated to reflect the pervasive and essential impact of rapidly evolving information technologies.
2. All graduates must attain minimal computing and information management competencies to practice in this new and volatile health care environment.
3. Some faculty members lag behind students in their knowledge of informatics and the use of technology. Behaviors within the sociology of medicine are complex and highly resistant to modification. Faculty reward systems do not currently foster innovation with technology.
4. The implementation of new technologies and their use depend on the cooperation of many players across the campus, which requires changes to the past culture of political and decision-making autonomy for academic units.
5. Many students still arrive with the expectation that one configuration of computer hardware and software will suffice over four years or that the school will be able to tell them in advance exactly what they will need to buy 2-3 years ahead. This is unrealistic as technologies and the curriculum evolve in a fluid fashion.

Strategies being implemented:

A. Building from pilot and demonstration projects, the School is integrating informatics skills throughout the educational continuum, not just at isolated points or in a few courses. Special funding for pilots has accelerated participation.

B. In reality, all campus graduates should possess the same set of baseline informatics competencies. The School is devising models that other schools can emulate or that may result in an inter-professional approach.

C. In conjunction with other efforts to identify the 'total cost of ownership,' the school is defining methods of projecting and budgeting for the multi-year needs and costs it must accommodate over time.

D. Painful experience has convinced us that we must focus on the use of only one or two software products that provide online course management.

Information Technology Tools for Introductory Astronomy

Fran Bagenal, Professor, Astrophysical and Planetary Sciences
University of Colorado at Boulder

Approximately 1100 students take introductory astronomy courses per semester. These courses are designed for non-science majors wishing to fulfill the natural science requirements of the College of Arts and Sciences' core curriculum. The large and impersonal introductory classes we must offer do little to change the fundamental disaffection that many students feel for the sciences. Introductory astronomy courses provide an opportunity, perhaps the last in their formal education, to enhance the science literacy of CU students.

The pedagogical goals of teaching introductory astronomy are: (1) to instill an appreciation of astronomical structures and scales, from planet Earth to distant galaxies, (2) to develop an understanding of science as a continuous process of coupling experimental and theoretical inquiries, and (3) to enhance quantitative reasoning skills.

How can technology enhance learning in such courses? The current lecture format is economical for the University but is inefficient for learning. Online materials are particularly effective at engaging students – either by offering the latest exciting images and results which are not available in textbooks, or by allowing students to explore the topic at their own pace and test their understanding as they proceed. Within a decade one can imagine courses being taught in computer 'studio' classrooms with no more than 70 students sharing 35 computers, arranged so that classes can integrate short lecture presentations with hands-on activities. In the meantime, we have to consider ways of moving towards a more student-based learning environment within the constraints of large lecture halls. To facilitate such a transition, the Astrophysical and Planetary Sciences Department is galvanizing its teaching efforts by building a set of tools for Introductory Astronomy.

The project objective is to provide resources for the whole department without restricting the individual faculty's choice of content or style. The project will build three types of web-based tools: tools for study, tools for lectures, and tools for assessment.

The ***Tools for Study*** will build on existing web-based modules created by individual faculty; these resources will be expanded to include student learning modules and self-assessment tools that faculty can incorporate in their courses. An example from The Solar System can be found at http://dosxx.colorado.edu/~atlas/sess25.1.html and from Stars and Galaxies at http://cosmos.colorado.edu/astr1120/

The ***Tools for Lectures*** include the development of a searchable database of astronomy and physics demonstrations and a "best practices" guide on increasing active learning (e.g. the Mazur technique).

The ***Tools for Assessment*** will provide resources that allow faculty to efficiently construct effective means of assessing student learning, primarily by creating a database of homework, quiz and exam questions that emphasize concepts and processes rather than facts.

Since these introductory courses are designed for non-science majors, it is hoped the resulting student-based learning environment will not only enhance science literacy and quantitative reasoning skills but also instill a long-term appreciation of the scientific process.

Vertical Integration of Technology into the Geography Curriculum

Barbara Buttenfield, Associate Professor, Geography
University of Colorado at Boulder

Departmental Vision on Teaching And Information Technology

The intention in bringing information technology into our classrooms is to enrich the classroom experience, to nourish the students, and to give them understanding and skills to continue that process on their own. Information technology can be integrated into the classroom in two ways. "Teaching about information technology" refers to classes emphasizing information technology concepts and skills. The primary focus is on the nature of the information and the mechanics of the technology. "Teaching with information technology" refers to classes emphasizing specific aspects of geography, climate, hydrology, etc. The primary focus is on the environment, and the information technology provides a mechanism to learn.

Recent advances permit us to take information technology anywhere we want. We apply information technology in GIS, digital cartography, remote sensing, and spatial modeling. Information technology helps students develop analytical skills, computational skills, critical thinking skills, and visualization skills. However, classroom experience within the Department of Geography has shown that student computer skills are uneven and can create a situation where technology becomes an impediment rather than an asset to learning.

The Department of Geography has designed a vertical approach to integrating technology into the geography curriculum at CU-Boulder. The primary objective is to implement a coordinated set of software tools taught at freshman through senior level courses in physical geography in order to make the use of technology "transparent" to students so they can concentrate on the subject material. At the freshman level, two labs will introduce students to the web, its data resources and manipulation of that data. Mapping our Changing World, a 2000 level course that introduces students to mapping techniques and GIS, was redesigned to emphasize Internet access to spatial data and mapping software. The class is intended to let students gain confidence and independence not only in searching for online resources but also in deciding which resources are most current, most valid, most reliable and informative. A capstone course at the sophomore level, to be required of all geography majors and offered to students outside of the Geography department, is being developed to provide the continuity of instruction in technological formats used in later courses.

A Showcase Project: "GIS for the Rest of Us"

Earth scientists in many units on the CU-Boulder campus have an interest in GIS technology but have not developed the technical resources or expertise to set up and maintain the application software. This project will implement Internet-based data delivery software with embedded GIS capabilities, to deliver GIS training modules and student assessment tools on the Internet, and to test these in several undergraduate geography classes.

The GIS training modules are based on a common data set describing the topography and hydrology of a watershed on Niwot Ridge, an alpine study site about 30 miles from Boulder and near the Continental Divide. Since much of the water stored in the snowpack is eventually used as drinking water for city residents, it is important to know the expected runoff volume each spring and summer. City officials use snowpack models to plan for community water use. The modules take students through prototypical tasks required of professional environmental analysts to enter GPS field measurements of snowdepth into a GIS, create a digital terrain map, and model snowpack depth, so as to predict the availability of Boulder's drinking water.

Two modules are designed to enter snowdepth field data and to model terrain; a third module modeling snowdepth with terrain and landcover is nearly complete (http://peking.colorado.edu/mercator/atlasdocs/atlas/index.html). Online logging tools are being deployed to monitor student performance and refine the modules. These modules will be tested for usability in lower division courses in Fall 2000, and also critiqued for interface design by upper division classes in Map Design and GIScience.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0003

Title: Beyond Gravity

Author: Alex De Vries

Organization: Hogeschool 's-Hertogenbosch

Year: 2000

Abstract: The Hertogenbosch Academy of Art and Design in the Netherlands has developed a system of project education in which the school cooperates with technical research industries, museums, and universities. The session will show how the resulting international workshop, "Beyond Gravity," merges traditional art techniques with modern media, presenting a new approach to art education in the digital era.

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Beyond Gravity

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Domain 2, Teaching and Learning
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Beyond Gravity, Ceramics in a digital culture

In July 1999 the 's-Hertogenbosch Academy of Art and Design organised in cooperation with the municipal Museum het Kruithuis and the European Ceramic Work Centre and the ceramic industry the workshop 'Beyond Gravity, ceramics in a digital culture'.

For two weeks 30 ceramic-students from the Netherlands, the USA, Great Brittain, France and Spain explored the possibilities of digital designing for this art discipline that is so literally earth bound to the material of clay. In cooperation with the workshopleaders, the renowned artists in the field of sculpture and ceramics Walter McConnel, Nicolas Dings, Thom Puckey and Pjotr Müller, they experimented with 3d design programs – such as as 3D Studio Max, Desk Artes and AutoCAD - digital animation, soundprogrammes et cetera to confront themselves with a couple of basic questions that are being raised in the comtemporary world of art-making. To the students in ceramics all this was new, as well as in some extent to the artists.

As Walter McConnel put it: **"The students and the artistst were considering the rapid on-slaught of new technologies and digitalisation of information and images in the culture. The questions raised considered: What is the place for objectmakers and ceramists within that development, how do they come tot terms with that? Is it our place to simply ignore what goes on in that virtual space, or is it something that an artist interested in physical phenomenon and materials in real time and real space can approach as a new tool that the creative individual can use to see what it does for his work and still maintain that connection to the sensual material world? Or does one say, I can make things rotate and spin and do things beyond gravity and I can visualise things I can't see in real space, so maybe I abandon on that and from now on I work on the computer?"**

All these questions came out of a short essay the famous art critic and philosopher Arthur Danto was asked to write on this topic. This was his essay:

Handedness and Post-modern Art

by Arthur C. Danto, 1999

The idea of craft is an unanticipated product of the industrial revolution. Since everything humans did before that time was craft in one way or another, involving hand and judgment, the concept of craft had nothing to contrast with. But the Industrial Revolution robbed the hand of all its skills, building them instead into machines, leaving the hand to perform repetitive basic actions – turning a knob, tightening a nut, pressing a button. Everything that distinguished handed beings was appropriated by the machinery that turned out uniform products in quantities limited only by the capacity of society to consume them.

The handed being could ideally have been eliminated were it not for that the whole process needed consumers, with the wherewithal to buy bicycle wheels, grooming combs, snow-shovels, bottle racks, and urinals, all in profitable numbers. Craft emerged as a concept in the late 19th century as an anti-industrial ideology, which advocated returning skills to the hand, and aestheticizing the autographic quality of non-uniform products –the hand-made, the hand-wrought, the hand-sewn, the hand-spun, the hand-woven, the hand-molded. To choose the often rough and uneven craft-object over the smooth and uniform industrial object was to declare ones preference for a society radically different from the one industrialization generated. It was to will a more primitive and allegedly a more fulfilling form of life.

Craft-folk were in but not of the industrialized society, as Christians were in but not of the Roman Empire. My little list of industrial products is an enumeration of some of the better known ready-mades of Marcel Duchamp, objects he selected for their absolute lack of handedness, and for being beyond good taste or bad. No one can differentiate one metal grooming comb from another by aesthetic criteria – they are all alike. So no one can have good or bad tast in grooming combs. It is rarely emphasized that Duchamp's most notorious work, *Fountain*, is a ceramic object, all the more ironic in that clay was a paradigm material for the celebration of handedness. Industrial production minimized difference and maximized efficiency: who needs a crafted urinal? (Duchamp famously said that plumbing was America's greatest contribution to human happiness.)

Much of what we are surrounded by is ready-made, like nails and screws. Duchamp's brilliance lay in putting the question of why not ready-made-art – art that could be picked up at the supermarket, costing no more than accessory for dog owners?
With this, Duchamp opened an immense gap between art and craft, for he demonstrated that painting and sculpture, through their handedness, were examples of craft, exactly like ceramics or metalwork. The real contrast puts handedness on one side, and intellect on the other. He spoke with contempt of 'olfactory artists', in love with the smell of paint. Litlle matter if they were in love with the smell of sawdust or of wet clay. For him, the work of art was an embodied *idea*. Many artists have displayed a contradiction Duchamp escaped, deploring industrial production if favor of handedness, but enjoying its benefits in the bathroom, the garage, and workshop.

The Industrial Revolution, transferring skill and strenght to the machine, reduced the human body to a mechanical adjunct. The Information Revolution transferring computational and inferential power to the computer, reduces the human mind to a computational adjunct, stoking its memory with data. Under industrialism, differences between bodies are irrelevant as differences in minds are irrelevant in data processing.

But the latter presupposes very different kind of workers – a proletariat of literacy. Working conditions, by contrast with those in factories, are almost paradisal – clean, silent, dry, warm. It is easy to see how Americans, queried on the subject, would choose a job in the cublicle, working with the lastets technology, to any other employment. The way the computer is turned to after hours – playing video games, surfing the net, chatting with strangers – is evidence that the machine is not regarded as oppressive. Information workers remember how their parents' lives wer brutalized by factory work, using their scant free time to drink and brawl. The proletariat of literacy has ample leisure to cultivate the inner self through aerobics, meditation, rock concerts, recreational sex, and travel.

Duchamp was a prophet in showing the possibility of handless art. The practice of art became a conceptual excercise, leaving the hands clean. Think of how Duchamp dressed as a dandy, by contrast with the Abstract Expressionists, their workboots and overalls crusted with talismanic paint – as if they were aborigines!

There cannot be conceptual craft, if craft had handedness as part of its essence. But perhaps handedness is not as important as the critics of industrialism presupposed, in seeking through the hadicrafts a return to pre-industrial ways of life. Perhaps the distance between art and craft will soften as the crafts become more conceptual. Indeed, that has already begun to happen, as artists recognize the poetry of use, and draw referential inspiration from the forms of historical cultures. Handedness after all, was also corollary to modernism, understood as fidelity to the material conditions of the media. Handedness and handlessness alike are corollary to Post-modernism, understood as meaning that everything is open to artists. The post-modern era of ceramics, under which handedness is merely one concept of many available to the ceramist, has only just begun.

The workshopleaders used this text to formulate assignments the students could work on. Pjotr Müller worked with a group of students who developed an improvised series of claymations (animated clayfigures) that were digitally filmed. Nicolas Dings asked his students to search the internet for interesting images and to manipulate them with the computer and to print them in silk screen technique on ceramic cilinders as a group piece. Walter McConnel went into the far more conceptual ideas of his students who used the computer as an instrument to get deeper into the meaning of things, to explore information. Students for example came up with the combination of using riverclay creating the form of a large, dark flat tomb-stone to comment on the monumental St. John Cathedral in the town of 's-Hertogenbosch. Thom Puckey and his students tried out several experiments with the computer as a communicator and translater of ideas: for example sound into concrete form. In every aspect of the workshop there was an ongoing relationship between te mental and the fysical aspects of the creative process. Working on the computer resulted in working with clay and plaster, but also the exploration of the material led to experimenting in modelmaking with computer aided design programmes and cad-cam techniques. An intriguing work of art, brilliant in it's simplicty was a work by Maria Johansson who photographed every participant of the workshop, selecting only their eyes and putting these into a series of film, for the moving image she wanted tot present. She made a clay mask of a kind of phantom face, which she attached to a computerscreen. Through holes in the mask all the eyes of the workshop participants beamed at you, one after another.

Several experts on digital designing were asked to give lectures on the subject, to instruct the students in using the computer programmes et cetera. As inexperienced as the students and the artistst were, at the end of the two week-workshop period there were a lot of fine results to show.

The Dutch ceramic artist Jeroen Bechtold who designed the logo for the international artfair the Ceramic Millennium of the Ceramics Art Foundation that was held in July 1999 in Amsterdam was one of the lecturers. He said: **"It's wonderful nowadays to be involved with computers, because the real, actual world is quite limited to gravity: therefore you can not do certain things. And I always have these crazy ideas on things that should be possible like cups that float or stand on just one point. Through the computer I am suddenly able to make pictures of my thoughts and making pictures of my thoughts is already the first step into realising them in the actual world. That's what I am aiming at: to make things that make sense in both worlds, for there áre two worlds!"**

One of the workshop students, Christine Pitch, made such a picture of a thought by computerdesigning with Desk Artes an object that was rapid prototyped by TNO Industries in Delft on the last day of this workshop. During an excursion to Delft -were also the oldest ceramic factory in The Netherland was visited, the Royal Porceleyne Fles, famous for their Delft Blue- TNO Industries presented this prototyping technique (a kind of threedimensional waxjet printer) to the students and Christine was surprised with the fysical shape of her design that she only had seen on screen. This conceptual piece of art wich she gave the title 'Wilhelmina', in real time and space suddenly seemed to be useful for a curious purpose: an armpit sweat collector.

The working process of the students, artistst, lecturers and assistants was filmed by Andrea Boada Páramo and with the help of another student, Martijn Verhallen, she digitally edited the rough material into a video documentary that was preseneted at the Cermaic Millenium in Amsterdam in the week following the workshop. The presentation of the Academy consisted of the video documentary and a cd-rom display of ceramic art works made by students. This cd-rom was designed by graphic design students Onno van Sabben en Marieke Gemkers. Between the presentations of internationally famous ceramic galleries this presentation looked oddly out of place, because except for the rapid prototyped armpit sweat collector of Christine Pitch there was not a concrete work in sight in the fair-stand of the Academy. Despite this the Academy got the highest attention for this experiment in the field of ceramics.

I was asked to give a lecture on the educational principles of the Academy and had an discussion with the director of the New York State College of Ceramics of Alfred University on the differences in approach of our institutes. This is what I stated:

How to keep space empty?
No limits, but opportunities
by Alex de Vries 1999

Ceramics is that bowl you make with your hands. Not the clay itself, but rather the notion that you can create a shape from a thought, an idea. The content of ceramics is emptiness, the space you enclose and where you can put your thoughts. It is the same with all forms of sculpture. Sculpture that fills space and therefore reduces it, gets in the way, ruins the view, takes away the room to think and breathe freely. Good ceramics, good sculpture, good art opens that space: an immense void that remains unfilled, so that you as the viewer can fill it for yourself, give it your own meaning. How to increase that space is the dilemma of art, because every artistic object suddenly becomes a beacon in space. The trick is to prevent it from becoming a barrier, or from separating itself from its surroundings. And that is exactly what happens so frequently in all the different disciplines of art: the choice of separatism, the choice of being valued for the self, of being judged separately from the surrounding space, separately from other disciplines, on special merits of the individual technical particularities and the accompanying content complications, on the limitations you set yourself. It is a restrictive manner of thinking that must be completely rejected because it concretizes segregative

thinking in an elitist manner that is objectionable on moral and ethical grounds. Don't expect a plea on behalf of the politically correct view that one form of art should appreciate and respect the other, for that is an impossibility. If you choose one, you automatically reject the other - because you've found something better. It's fine to specifically not want something, as long as it originates from the conviction that you want to achieve communication that gives direction and is not a withdrawal into and onto itself.

Artists have to take a position in order to be able to overview the space they have to offer and this position has to be expressed literally and figuratively. Thinking in disciplines, which is nurtured in so many art forms, even in ceramics, means you often have to cross an enormous sea of limiting conditions in order to reach a small cramped island. Your visit, your curiosity and interest are experienced as an invasion, occupation and threat. You come from the outside, what are you doing here?

The bowl that you make with your hands is the archetype of ceramic shape and clay is not used, except in a certain faith where we are made of dust and will return to dust, where we are made of clay into which life has been breathed. The earthenware bowl is an object that offers an aesthetic solution to the functional problem of the handbowl- which leaks as a sieve. There is no simpler shape that catches the emptiness for you, that can be filled with whatever you wish and that you can drink empty to your heart's desire. The simple use of this object has therefore received an artistic significance and has created a spiritual space you can fill until it overflows and from which more continues to flow. That's the way that ceramic island in the ocean should be perceived, as a vessel from which the sea has been poured, which invites us to sail, fish, traverse, dive into, swim in. The possibilities are endless.

Art education should be based on that involvement in the surroundings rather than on the involvement with the self. All achievements belonging to a discipline, whether it be ceramics, painting, audiovisual arts, or computer-controlled design, only receive significance when they are related to the considerations in respect of content made from the viewpoint of the artist or designer.

The most important material used by the potter are the broken pieces of his own unsuccessful work. The broken pieces represent the mistakes that he will not make anymore. He will make new mistakes and drop and smash a lot more work, but this will be different, better. In order to organize a new space, you need to have a good foundation and that is what the pieces are for. The house you demolish is the foundation for the new one you are going to build. In order to create space, you must first know what you are going to knock down.

In Den Bosch, Ceramics is a flexible, or autonomous, degree course. The academy is called the Academy of Art and Design and that is in fact the only name in art education that still ought to be officially recognized. To that end, the Academy in Den Bosch has, for the time being, added 'and other media' for each discipline, but that has come into existence out of a sense of defence. You should not defend, but rather invite adversaries to sit around a table and negotiate. Painting and other media, Sculpture and other media, Ceramics and other media: they are all names that emerge out of a traditional, contorted way of thinking in disciplines. Luckily, in practice sculptors do graduate from the Academy now and then with a painting major, because painting for a sculptor is simply another media available to him in this type of education. This way of thinking and working is concretized by the Academy in conjunction with the local surroundings, with the existing artists' initiatives and the new ones taken up by the newly graduated students as well as museums, in particular Het Kruithuis, music and theatre podiums, businesses and industry such as Cor Unum, and last but not least the European Ceramics Work Centre (EKWC). With the objective of being a facilitating research and expertise centre in the field of ceramics, the EKWC has the makings of that cramped island way of thinking. In practice, just the opposite has occurred: artists with all kinds of backgrounds within the EKWC have come to understand the possibilities of ceramics, thus creating an enormous space for themselves conceptually speaking. More than ever, ceramics allows itself to be moulded by this in terms of its content, and that drying clay on the hands of the artists leads to a new source in their heads being tapped. New techniques arise, new images, new ideas, new times, different skills, extraordinary opinions, more space. No wonder the Academy

happily and frequently asks these artists to be visiting lecturers and give the perspective of ceramics a panoramic appeal without being drawn into vanishing points.

Only by having a cohesive view of art and design in all its expressions and technical disciplines can arts education develop into teaching that has a permanent understanding with its surroundings and that raises artistry to the level of being part of a larger whole - not encompassing, but creating. In order to create, you need a tool. And hands formed into the shape of a bowl are an excellent tool. But at the same time you can do so much more with your hands – it's all a matter of thinking. And like every form of art, ceramics is mainly that: the space in your head that knows no limitations, but opportunities. Seize them.

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Abstract

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ID Number:	EDU0015
Title:	Courseware Development For Distance Education: Issues And Policy Models For Faculty Ownership
Author:	Kimberly B. Kelley
Organization:	University of Maryland, University College
Year:	2000
Abstract:	The issue of who owns courseware is of great concern to faculty and the university. Regardless of the type of institution, intellectual property (IP) policies that address ownership are essential to ensure incentives to create courseware, avoid litigation, and avoid competition between institutions. This paper provides an overview of current policies of higher education institutions concerning faculty ownership. You'll learn the issues that universities should consider when creating IP policies that address the emerging area of courseware development and review the current models available for adaptation. Examples currently in use for faculty ownership also will be presented.

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Courseware development for distance education: Issues and policy models for faculty ownership

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Introduction

The issue of faculty ownership in higher education has been somewhat sedate until the last few years. Until recently, the issue was straightforward, faculty typically held copyright with everything except patents. Until technology entered the picture, this was the policy arrangement university administrators, either explicitly or implicitly, maintained with their faculties. With the advent of the Internet, and in particular the capabilities of the World Wide Web (Web), issues of intellectual property have once again become the basis for discussion and debate. One of the most interesting and complex issues of intellectual property in the digital environment is faculty ownership of online courses, sometimes referred to as courseware. In the forums where the issue of ownership is discussed, very strong opinions come forth from both the administration and faculty on who should hold copyright and each constituent group makes it clear they are concerned with protecting their investment in the final product (Carnevale, 1999; The Node Learning Technologies Network, 1999; Twigg, C., 2000).

On the face of it, it would appear that there is a deep chasm between the two groups and both sides have legitimate concerns. Recent position papers on faculty ownership demonstrate the extent to which differences of opinion exist concerning faculty ownership of digital courses. For example, the American Association of University Professors (AAUP) developed a statement on copyright (http://www.aaup.org/spccopyr.htm). In their statement, they assert that "it has been the prevailing academic practice to treat faculty members as the copyright owner of works that are created independently and at the faculty member's own initiative for traditional academic purposes. Examples include class notes and syllabi, books and articles, works of fiction and nonfiction, poems and dramatic works, musical an choreographic works, pictorial, graphic, and sculptural works, and educational software, commonly known as 'courseware.'" (AAUP, 1999). In contrast, the Association of American Universities (AAU) states "the university should own the intellectual property that is created at the university by faculty, research staff, and scientists and with substantial aid of its facilities or its financial support." (AAU, 1999). With such conflicting positions, it would appear that the policy formulation process will be difficult and that the two sides of the issue have very strong opinions that will be difficult to resolve.

The Internet and the Web

The advent of the Web had an important role to play in causing academic institutions to revisit the question of ownership. Unlike the traditional face-to-face classroom, where a professor's notes, PowerPoint slides, and other course materials do not have coherency until the faculty provides the pedagogical link, the online course can be a stand-alone commodity. In the majority of cases, it is a tangible product that can include myriad products such as Web pages, video clips, packaged readings, animation, and simulations that together create a package that is tangible and marketable. In the view of faculty, even though the online course is a tangible product, it does not have coherency until the faculty provides the intellectual "glue" (Carnevale, 1999; Twigg, 2000, p. 15). However, there are many examples of online courses being offered where multiple individuals, all of whom are roughly equally qualified to provide the intellectual links as the originator of the course, teach an online course. As a result, debating whether the online course can be delivered in the absence of the creator is less of an issue than deciding how to address the ownership and use question for what is already a marketable commodity in use at many institutions using myriad types of agreements with their faculty.

Revenue vs. Control: Two sides of the Coin

How did the ownership question surrounding online courses become so important? The reasons are essentially two fold: revenue and control. In the view of many institutions, there is the possibility of significant financial gain through offering an online course, degree program, or certificate. The possibilities for how to benefit from the online course are many and include: 1) reaching a new student population currently untapped, 2) offering a single course in multiple sections without the need for classroom space, 3) licensing the course externally and receiving royalties, 4) increasing the number of enrollments in a single course, and 5) combining a few online courses in a novel manner to create a certificate that allows students to have a "product" without having to pursue an entire degree. All of the uses of the course represent increased "efficiencies." As a result, the online course represents a profitable return on the resources invested to develop and deliver an online course. The potential revenue stream that online courses have is important to academic institutions that are constantly seeking new avenues to support the academic enterprise. Further, online courses that have the potential to keep institutional costs constant while exploiting the institution's intellectual property are particularly important.

In recent Pew symposia on the topic of ownership, the attendees defined the revenue question as the "gold mine scenario." (Twigg, 2000, p. 17). In the view of the conference attendees, the likelihood that institutions or their faculty will get rich, was roughly equivalent to winning the lottery or garnering significant financial benefits from the royalties on the sale of a textbook. From the perspective of traditional institutions of higher learning, the preponderance of the attendees at the Pew symposium, that perspective makes sense. Traditional institutions may be offering online courses, but they are not the primary mission of the university. However, from the perspective of institutions doing significant delivery of online courses, and pursuing business ventures for marketing and delivering their online courses more widely, the potential profit is real and ownership plays a critical role in determining the extent to which the institution and its faculty benefit from the development and delivery of the online course.

The second issue, control, has to do with academic freedom, quality, and faculty concerns about their profession. In particular, the fear faculty have that online courses mean that fewer faculty will be employable and institutions of higher learning will be able to "do more with less."

According to a recent report on faculty views, "many faculty believe that if their institution owns their work, their academic freedom is jeopardized." (The Node Learning Technologies Network, p. 16). From the viewpoint of many faculty, ownership is directly tied to academic freedom. If the institution owns their work, there is the possibility that their employer might want to have a greater say in their work products. For example, institutions might want to edit faculty work, or give faculty "suggestions" for changes. The equivalent of this in the online course environment might be having an instructional designer rewriting an online lecture because the faculty's opinion is considered to inflammatory and as a result, could affect the "marketability" of the final courseware product. The portability of digital work, and the ease of making changes to digital content, heightens faculty awareness of the academic freedom issue and online courseware.

A second issue involved in control is the issue of quality. There is a concern among faculty that once the control is transferred to the university, the quality of the product could be jeopardized. Or, the original product, that was up-to-date when it was created, could become outdated and the faculty originator could find he is still mentioned as the author. In the same vein, the faculty member might be held responsible for the content without knowing the content is still being delivered elsewhere at the university. Faculty want ownership so they have the right to update the content, ensure the accuracy of the facts presented in the course content, and respond to developments in the field as they occur and need to be incorporated into the course. In the view of many faculty, if they do not have ownership, then it is possible they would not have the authority needed to ensure that their original work product continues to have the same academic integrity it had when it was developed.

Another issue involved with quality revolves around an institution's decision to license a course to other institutions. If a separate institution has control, the faculty creator might not have a say over how the course is licensed or whether the same quality measures are in place at the institution licensing the course. Also, once sold, the online course is the property of another institution and their quality controls may be quite different than those the faculty member would like to be in place when the course is offered.

Another control issue surrounds the concept of doing more with less, or achieving efficiencies through the use of online courses. Essentially, this viewpoint argues that faculty can be replaced, or their numbers diminished, because fewer people are needed to deliver the course, or, the institution can substitute part-time faculty for full-time faculty but offer an equivalent online course. The use of part-time faculty would decrease the institutions overhead and makes the delivery of the course cheaper. Taken to its extreme, this view also suggests that in some cases, courses will no longer require a faculty member at all if the technology is sophisticated enough. This view has been referred to as the "player piano" syndrome (p. 19). In this syndrome, the faculty could be readily interchanged, or no instructor would be needed. In the view of some, this scenario was unlikely. The reason for believing this is that the faculty member represents an essential element of quality. The better quality courses require interaction and in the view of the participants at the Pew symposium, "people don't go to college to get 'canned courses.'" (Twigg, 2000, p. 19).

There can be no doubt that quality online education includes a high degree of interaction. It is an essential element and provides an important part of the learning experience. However, it is difficult to measure the quality of the online course with that of the traditional classroom. Some online courses offer enhancements unavailable in the face-to-face classroom that improve learning and in some cases, make them superior to the traditional delivery methods. Further, a dynamic, well-designed online course with an average faculty member may well be superior to a face-to-face course with an average faculty member.

The Institutional Perspective

While faculty have legitimate concerns, so do the institutions developing and delivering online courses and programs. In the view of some institutions, faculty are not the exclusive creators of online courses. In such cases, including at the University of Maryland, University College, the faculty member is one of several individuals who contribute to the final product or "courseware." The faculty member is part of a team; he is not the only individual making a significant contribution to the final product. Therefore, the idea of one individual being the "creator" is questionable when so many contributed their talents and abilities to create a high-quality online course. At what point is the faculty member no longer the creator? This is a question that is difficult to answer and must be addressed in policy. However, institutions want the involvement of everyone considered in the decision on whether the faculty member is the creator and if so, what that means in terms of rewards and use of the final product.

Further, there is the issue of the institution's costs to develop and deliver the online course. There are many estimates of what it costs to develop an online course. They range from $25,000 to $50,000 depending on the discipline and the extent to which multimedia is incorporated. In my view, these estimates are conservative. Institutions see their investment in courseware as being similar to the investment they make to obtain a patent. Therefore, they have a right to own courseware also. Typically, faculty do not own patents, they receive royalties instead. From an institutional perspective, the same agreement applies in the case of courseware. If the cost to the institution is significant, then the institution has an interest in ownership and is also very concerned about the return on its investment in the course. Delivering online courses may not be as lucrative as some suggest, but even so, institutions want to maximize their return, no matter how small it may be, to attempt to be efficient with the use of limited resources.

Another issue of concern for institutions, which also revolves around return on their initial investment, is licensing to external organizations. The process of licensing is complicated and few institutions have done it successfully. However, should an institution find a niche and an opportunity to distribute their courseware beyond the confines of their institution, they want the ability to do this to serve their community and potentially make a profit on the developed course while it is a viable product for sale. Courseware has a shelf life. Therefore, institutions need the flexibility to maximize their profit on the product before it is obsolete or in need of revision which requires additional investment by the institution and the creators.

Institutions are also concerned about faculty ownership and the resultant possibility of conflict of interest or competition. For example, the Arthur Miller case at Harvard University illustrates the complexity of the ownership question (Carnevale, 1999). In that case, Miller sold his videotaped lectures to Concord University. The current Harvard University intellectual property policy did not preclude this because Miller owned his tapes. However, selling the videotapes did represent a conflict of interest. Miller sold what could result in a loss for Harvard because potential students may decide to seek the degree with Concord, not Harvard. In this instance, it is unlikely. However, for lesser known institutions, small advantages in the market are important and can tip the scales in favor of one over the other.

Policy Issues

Most institutions and their faculty think the central question is ownership. However, *the essential question is what rights each party takes away from the transaction.* There are many policy models where ownership resides with the institution (e.g., Athabasca University, the Open University, and the University of Phoenix). It is interesting to note that the institutions that vest ownership in the institution are also the ones heavily involved in distance education and highly regarded in the field. However, there are far more institutions where ownership resides with the faculty member; which is more in line with traditional policy on intellectual property in higher education. During the recent revision of the University System of Maryland (USM) intellectual property policy, I have come to the conclusion that it is simplest and least controversial to begin with the notion that ownership resides with the faculty member, particularly if it has been the policy to have faculty ownership at the institution previously and the notion of faculty ownership is generally accepted. Giving faculty ownership, however, does not mean the institution has rescinded all rights to the works. On the contrary, ownership is far less important than who has the right to do what and in what time frame.

In the case of the University of Maryland System's recently revised policy, which includes the 13 campuses of the University of Maryland, ownership resides with the faculty member for traditional scholarly works developed using "usual and customary" resources. In the USM policy, "usual and customary" resources are defined as being "items provided routinely to all members of the personnel group at the unit level, such as office space, library facilities, or ordinary access to computers and networks. Additional items are not usual and customary unless otherwise specified in writing at the time of provision of the resource" (USM, 2000, p. 2). In the event that the faculty member and the institution differ on their definition of what is "usual and customary" the two parties *are expected to hash out their differences* at the inception of the project and develop an agreement that is equally acceptable to both parties. Further, the policy encourages the use of agreements between the faculty member and the institution that specify the rights of each party in the development of the project. It is at the point of developing an agreement that the institution and the individual can define the rights of each party and thereby ensure that what the institution and the individual need are taken into account with respect to intellectual property.

Tips on Defining Ownership. When developing a policy on ownership, it is important to consider the issues outlined below. The administration and the faculty need to come to agreement on these issues if the policy is to be useful and viable for all concerned.

When institutions seek to define ownership of courseware, they should take into account the following questions and issues:

- **The policy needs to explicitly state the underlying assumptions concerning ownership in the policy**. Who has ownership of intellectual property according to the policy? Institutions involved in distance education tend to favor ownership residing with the institution. Others begin with the notion that ownership resides with the faculty member. Whatever the decision, a choice needs to be made and clearly stated.

- **The policy needs to define how ownership will be shared and under what circumstances**. In deciding how to address ownership, there are three predominant models that provide a good template for deciding the issue.

In the first model, the institution asserts ownership but faculty are readily granted licenses to use the information provided it does not compete with the institution's use of the information. In the second model, the faculty have ownership but there are exceptions such as when the faculty exceed "usual and customary" use of institutional resources or when the intellectual property was created under a grant funded by the institution. In the second model, the policy defines ownership and then lists the exceptions to faculty ownership. The exceptions should be clearly stated.

The third model uses categories of ownership. Who owns what is defined by whether the work falls into the faculty-owned or institutionally-owned category. For example, in the USM policy, independent work is a category where faculty have ownership. Directed work is a category in which the institution asserts ownership. If this model is chosen, the policy will need to define the categories and then be clear when the work created fits in one category or the other.

It is possible to use more than one model also, if appropriate. The University System of Maryland's (USM) newly revised policy begins with the underlying assumption that ownership resides with the faculty member. The policy then utilizes two of the possible models. First, it provides categories where faculty own and do not own the intellectual property. In addition, the USM policy provides exceptions to faculty ownership when they use more than "usual and customary" resources. Both categories and exceptions were included because the university community felt that both were needed (USM, 2000).

In another case, Wilfrid Laurier University offers faculty a set of three choices concerning their ownership. In the first option, the faculty member may elect to keep copyright ownership but must also assign the university a non-exclusive, royalty-free license to use the material. If the faculty member selects the second option, he assigns copyright ownership to the university but retains certain rights of use. In the third option, he assigns ownership outright to the university. The financial gain for the faculty member increases as she goes from option one to three with three having the most money associated with it. This innovative approach seems to work well for the university and gives faculty a choice on how their intellectual property is handled (The Node Learning Technologies Network, 1999).

- **The policy must define what ownership rights students and non-faculty employees will have, if any.** The University System of Maryland (USM) does not assert rights over student ownership but does assert ownership of employee work including student employees.
- **The policy must specify revenues**. A policy dealing with courseware ownership must define the conditions under which the distribution of revenues is applicable and define the terms under which they will be shared. Further, the forms of revenue are more complex than most policies currently cover. For example, what is considered to be revenue? Does it include equity? Bequests? The types of revenue and how it will be shared must be addressed for the ownership question

to be successfully dealt with. In the case of the USM, we decided tuition was not revenue. This was an important exclusion from revenue sources.

- **The policy must address the issue of competition**. For the ownership issue to be resolved, it is important to include a reference to whatever policy the institution has on competition. Further, the policy needs to ensure that wherever ownership resides, creators will not use their intellectual property to compete directly with the institution's activities and programs. When faculty own the intellectual property, they may take their materials with them. Institutions need to define if there are to be limitations on how soon faculty can use materials in a similar or identical manner after they leave that may disadvantage the institution they are leaving. Specific agreements can address this issue but the institution also needs to ensure that a competition policy exists, that it is reviewed in the course of developing an ownership policy, and up-to-date to handle such a possibility.
- **The policy must specify the role of agreements between faculty and the institution.** It is important to have the policy handle the majority of questions concerning ownership. Having an agreement for every instance would be too time consuming. Therefore, the policy needs to define when an agreement is used and whether the agreement takes precedence over the policy. Further, institutions should develop a boiler plate agreement for faculty courseware development and ensure that they can be altered to meet different faculty needs. Kenneth Crews, at Indiana University Purdue University Indiana (IUPUI), has an example of a courseware contract that is innovative and forward thinking. A policy on

ownership should be accompanied by agreements that are standardized but flexible for negotiations between the faculty member and the institution.

The points mentioned here are the major issues that come up when developing or revising policies to address the issue of faculty ownership of courseware. It is important to begin a dialogue early, before distance education is a major initiative, to ensure faculty have incentives to create materials and the institution has the necessary protections it needs to support distance learning initiatives. The greatest difficulty is getting the dialogue started and keeping it focused on balancing the needs of both sides. Agreement can be reached. However, the issues may be contentious and require significant work and consensus building locally.

It is unlikely anyone will get rich in distance education. Further, it is rare when institutions find their courses being offered elsewhere by a former faculty member; or are likely to have faculty replaced by robots. However, these issues form the myths that make agreeing on the issue of intellectual property ownership difficult. Establishing clear policies is essential to, 1) the creation of high quality courses, 2) to ensure the commitment of the institution to delivering these programs, and 3) to decrease the likelihood of disagreements that end up in litigation. Everyone on campus can benefit from discussing the ownership issue and once a policy is in place, Web-based education can thrive and grow.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0056

Title: Digital Rights Management in E-Learning: A Case Study

Author: Heida Bea Ellenberger, Steve Griffin, and Ronald Legon

Organization: DRM Publishing, Eduprise, and University of Baltimore

Year: 2000

Abstract: Digital rights management (DRM) technologies and services protect and compensate rights holders of electronic resources. This session will cover rights-related challenges facing higher education institutions in Internet-based learning programs, show how DRM addresses these challenges, and present a case study covering issues, technologies, goals, and results.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0004
Title:	Early Followers versus Early Adopters: The Use of Technology as a Change Lever Leads to Increased Learning and Decreased Costs in a Computer Fluency Course
Author:	Carl Alphonce, Helene G. Kershner, Deborah Walters, Debra Burhans
Organization:	University at Buffalo
Year:	2000
Abstract:	Many early adopters of educational technology report increased costs, both in technology and in faculty time. This research shows how early followers can decrease costs by using existing on-line supplementary materials and a redesigned course structure that increases face-to-face contact and provides multiple means for students to learn course concepts.

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Early Followers versus Early Adopters: The Use of Technology as a Change Lever Leads to Increased Learning and Decreased Costs in a Computer Fluency Course

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Abstract:

Many early adopters of educational technology report increased costs – both in technology and in faculty time. This research shows how early followers can decrease costs by using existing on-line supplementary materials and a redesigned course structure that increases face-to-face contact and provides multiple means for students to learn course concepts.

Early Followers versus Early Adopters: The Use of Technology as a Change Lever Leads to Increased Learning and Decreased Costs in a Computer Fluency Course

Deborah Walters, Debra Burhans, Helene Kershner and Carl Alphonce

Introduction:

Early adopters of educational technology have found that most uses of technology to improve learning result in added costs both in terms of faculty time and in technology costs. For example, the development of the case-based ethics software at CMU [1] required a significant investment of faculty time to create a rich on-line environment. While many early adopters have willingly spent the many additional hours time required to develop and mount technology enhanced or on-line courses, this is not a model that scales for two reasons. First, while an early adopter may be willing to initially devote large amounts of time to their course, if the course continues to require significant additional effort, faculty members often find they are unable and/or unwilling to maintain the additional effort. Second, when other faculty members observe the amount of time invested by the early adopters they can become even less willing to engage in such activity themselves. This issue of additional time is especially problematic now when faculty members are seeing other increasing demands on their time.

Many early adopters have also found an increase in costs associated with the technology itself: hardware costs, maintenance costs, software costs, connectivity costs, etc. For example, the studio classrooms at RPI [2] and the Math Emporium at Virginia Tech [3] both required significant capital costs to build and equip. Synchronous video-conferencing style courses can be expensive in terms of building facilities and in terms of the recurring line charges. In addition, where students did not already have access to computers, the early adopters had to deal with the costs of providing such access. These cost increases are especially problematic, as the containment of rising costs is one of the top issues currently facing colleges and universities.

Technology as a Change Lever:

Yet the increasing use of technology in higher education can provide a lever for change. As faculty members and administrators consider how best to take advantage of the new technologies, an opportunity is presented to reconsider how education is delivered and to develop a culture of considered and deliberate change.

The traditional responsibilities in higher education result in the faculty designing and delivering the curriculum, while the administrators are the ones who consider costs and resource management. Thus there is a disconnection between the design of the curriculum and the consideration of costs, which may result in the best decisions not being made. Technology can act a lever for change in overcoming this disconnection. When faculty members deliberate upon the role of technology in education while bearing in mind the constraints of cost, the deep faculty pool of creativity and intelligence can result in new approaches to learning that are both pedagogically sound and have the potential to scale beyond the early adopters.

Technology can be a lever for change not only in the consideration of costs, but more importantly in the consideration of pedagogy. Nora Sabelli, Senior Project Director of NSF's Education and Human Resources program has called for more movement from passive to active learning, and has described the interaction between passive versus active learning and technology using the following diagram [4].

	Low Technology	**High Technology**
Passive Pedagogy	Lectures	Distance Learning
Active Pedagogy	Project-based	Project-based Simulations, etc.

Figure 1: Interactions between Pedagogy and Technology

The goal for Sabelli is to see more movement from the upper left quadrant to the lower two quadrants. Some faculty members may be interested in incorporating technology into their courses, but may not be interested in contemplating the effects of different pedagogies. For those faculty members technology can be a change lever - thinking about and researching new uses of technology can motivate discussions and considerations of pedagogy. Thus the technology may act as a change lever for movement from the upper left to the lower right quadrant.

Early Followers versus Early Adopters:

Early followers differ from the early adopters of educational technology in several ways. First, they do not have to create the majority of the on-line course materials for a course. They can utilize existing materials that are available either from the early adopter professors or from text-book publishers. Early followers argue that creating on-line course materials is akin to writing a textbook. Certainly not every professor writes their own textbook, and when a professor adopts a textbook he didn't write, he picks and chooses from among it's topics, provides additional course materials in areas he wishes to emphasize, and in general creates a course that bears his own personal imprinteur. Similarly not every professor will write her own on-line course materials, and when using materials from other sources, she will selectively customize them to reflect her own particular approach to the subject matter.

Second, by using commercially available course management software, the early follower can avoid some of the costs encountered by the early adopters in the creation of components of such software. In some cases the institutions incur additional costs through the licensing of course management software and the maintenance and hardware costs of servers for its installation. A second option is to let the textbook publisher provide the course management software from a centrally maintained site, and then passing the cost onto the students as a part of their textbook purchase.

By using existing on-line course materials and commercially available course management systems, the early follower does not have to spend the large amounts of time in the creation of materials that the early adopter does – which can lead to a significant savings in faculty time. However, compared to not using technology at all, there is a significant faculty time investment in selecting and testing the on-line materials. Good technical support is also required to install and test the materials in the local setting.

A third difference is that the early follower is often in the situation where students already have access to computers and the Internet. At some universities students are expected to either purchase their own computer or to otherwise find access to a machine [5,6]. At these and at other institutions there are also computer-equipped labs for student use on campus, as well as the connectivity required for Internet access. Thus the early follower is often in the situation where incorporating technology-based changes into their courses will not result in significant additional hardware, software, maintenance and connectivity costs. External forces are already causing institutions of higher education to provide the computing infrastructure – the early followers are simply utilizing that infrastructure in additional ways.

A final advantage for the early follower over the early adopter is that there is now more known about the potential pedagogical advantages and disadvantages of various types of usage of technology in higher education.

Pew Learning and Technology Program:

Through a grant from the Pew Learning and Technology Program (PLTP) [7, 8] a faculty team at University of Buffalo was formed to restructure a large enrollment computer fluency course. The goal of the PLTP is to demonstrate how the use of technology can lead to an increase in student learning, while at the same time reducing costs. The program provides the grantees with a structured method for analyzing the full costs of a course. By applying the method to both a traditionally taught course and a restructured version of the course it is possible to determine what the added costs or the cost savings are for a contemplated change in course structure. One advantage of this methodology is that it enables faculty to quantitatively measure the cost consequences of a course restructuring. But the main advantage comes from simply engaging faculty in the consideration of costs - the various tradeoffs between ideal, yet unaffordable instructional methods and more cost effective, yet pedagogically sound instruction. Through such discussions, creative solutions to the tradeoffs can arise that maybe superior to even the high cost methods previously utilized.

Redesign of a Computer Fluency Course:

The faculty team redesigned a computer fluency course for non-majors. The traditional course involved three hours of 200 seat lectures taught by faculty and two hours of thirty seat labs taught by graduate teaching assistants per week. The first step in the redesign process was to determine the learning goals for the course. The team had been following the work of the committee charged by the National Research Council to answer the question, "What should everyone know about computers and information technology?" Their report, "Be FIT: Fluency in Information Technology" [9], identified three classes of learning goals: concepts, skills and capabilities (or critical thinking). The report argued that computer literacy courses that only teach skills could be improved by including concepts and critical thinking as well. For each of the three areas, the report specified ten specific learning goals. Since the UB course had already included all three areas, the team chose to adopt almost all of the thirty learning goals specified in the Be FIT report.

The next step in the redesign process was to determine which aspects of a computer fluency course were amenable to improvement through increased use of technology and which aspects are best preserved in their more traditional form. This process lead to the following general goals for the redesigned course:

- To increase learning, especially active learning;
- To provide multiple means for students to learn the course concepts and skills;
- To preserve or even increase the face-to-face contact; and,
- To decrease costs.

The course team did not want to take the route of some early adopters and create an on-line course, as there are advantages to face-to-face interactions, especially when learning to use computer technology. In addition, it was decided that for some course material there are advantages in continuing to use large section lectures. Thus the on-line materials were viewed as a useful supplement to the more traditional components of the course.

Despite what appeared initially to be conflicting goals, the team used these goals to constrain their thinking about the redesigned structure of the course. By adding in considerations of how technology could be used to achieve the goals, the team found they had to create new ideas for the course structure. This analysis lead to the rethinking of the basic pedagogy of the course and the creation of novel solutions to satisfy the constraints.

Increases in learning were predicted to come from an increase in lab hours. The additional lab hours are made possible both through the use of undergraduate learning assistants, on-line grading and through decreasing the lecture hours. The latter is possible because the web-based and CD-ROM supplemental materials will provide students with multiple means to learning the conceptual material. In addition, there is evidence that for some topics students learn more from the experiential, active learning during labs than from lectures in computer fluency courses [10]. For example, watching a professor demonstrate how to use a spreadsheet during a lecture is less effective than participating in an active learning exercise in a lab. But not all lectures were replaced, as they can be good for presenting man aspects of the conceptual material. Short video clips of portions of the lecture where hard to grasp concepts are presented will be placed on the course web-site to allow students to watch and listen to the presentation multiple times. In addition, short video clips on topics like setting up an email account at the university and other site specific items will be created.

The use of on-line diagnostic quizzes is also expected to lead to increased student learning. On-line tests in which all but the essay questions are graded by the computer may also lead to better learning, as the students will be provided with immediate feedback at the end of each test on their performance. This on-line testing, grading and automatic grade reporting will also save faculty time. In addition, by using the automatic randomization and selection of test questions, the faculty time spent in test preparation can be reduced.

Since this particular course is designed for students who are not comfortable with computer technology, it was determined that it is not possible to replace the bulk of the lecture/lab course with on-line instruction. In fact, for the student population in the course, it was felt that more one-on-one, face-to-face learning opportunities were required to provide the students with a solid foundation in computer fluency. The challenge was how to provide this while at the same time reducing costs. One part of the solution involves using on-line testing and a commercial course management system, as this allows undergraduate student learning assistants (ULA's) to be used in the place of graduate student teaching assistants (GTA's). Without this use of technology, it is not possible to use ULA's, as our university prevents ULA's from doing grading and grade recording. There are several pedagogical advantages to using the ULA's. First, the GTA's were typically computer science and engineering graduate students during their first months of living in the US, and were unfamiliar with US undergraduate education and culture. Thus there was often a mismatch between the undergraduates, many of who were computer-phobic, and the graduate students who had been computer savvy for years. ULA's on the other hand tend to be undergraduates from disciplines other than computer science and engineering who have more recently learned the basic concepts of computing and thus are better able to understand the common misunderstandings of the novice users. In addition, since the GTA's are more than twice the cost of the ULA's, it is possible to double the number of assistants and still maintain a cost reduction. This means that more students can receive face-to-face help at once.

To help reduce the development and maintenance costs the faculty team decided to use existing on-line active learning materials that are available from either textbook publishers or from faculty at other institutions. In addition, a commercially available course management system will be used rather than having the faculty write their own portions of such software. Thus by being early followers, rather than early adopters, the team expects to see time (and thus cost) savings that are not possible for early adopters who must create much of their own courseware.

During the first year of the restructuring project the faculty team is in the process of reviewing and selecting commercially available on-line and CD-ROM materials, and in collecting base-line data from the course that is still being taught in its traditional form. A pilot version of the restructured course will be taught in the summer, and full-scale implementation will begin in the second year of the project. The success of the restructured course will be judged by comparing student learning, changes in student attitudes towards computer usage and costs in the new course against the same base-line data collected from the traditional course.

Outcomes:

One outcome of the project has been the plan for the restructuring of a specific course. In terms of cost, the plan indicates that the per student cost of the course will drop from $248 to $114 if the enrollment is held constant. If the enrollment grows from the current 490 to the maximum possible enrollment of 665 students per semester, the per student cost would drop to $99. Thus significant cost saving are predicted. Some of the cost savings will be seen by the institution as actual cost savings – fewer dollars expended. Another part of the savings will be seen by the faculty members in terms of their time commitment as we predict that less time will be required in lecture preparation, lecture presentation, test preparation, test grading and grade reporting. Thus faculty members will be spending less time on some of the management aspects of the course, allowing them to spend more time on student interactions or other activities such as computer science education research. While the faculty team believes that learning will also improve, the results of the testing of this hypothesis will not be available for another year.

A second outcome is that the faculty team is now well versed in considering the costs of instruction when designing courses. While one benefit of this is the redesign of the specific course, a major benefit is that the faculty members can now apply what they have learned to the redesign of other courses.

What is Necessary for Success for Early Followers?

The experience of the course team in the redesign of a computer fluency course provides evidence of the following four prerequisites for success for early followers.

1. Physical infrastructure
   If the physical infrastructure necessary for the course does not already exist at an institution, then the cost of providing such infrastructure will reduce any cost savings. However, many institutions have found it necessary to provide the computer labs, networking and software even when they are not used directly in technology enhanced courses. This infrastructure is becoming a normal cost of business for higher education. The majority of today's students have their own computers and expect their college or university to provide the necessary infrastructure for their effective use. The creation of technology enhanced courses can provide another means of capitalizing on the existing

infrastructure, and the potential cost savings from such courses may be used to help offset the operating costs of the physical infrastructure.

2. Technical support infrastructure
   The UB course team found that they spent more time than expected dealing with installation of new software in the lab. An analysis of the additional time found that faculty members were spending significant time in trouble shooting problems that arose when using the software available from publishers and the course management software. At the time it was not clear whether the problems were with the software, or with the installation of the software in the laboratory server environment. After receiving assistance from well-trained technical support staff it was determined that most of the problems were due to inappropriate installation. Another example where the additional faculty time required could have been avoided was in the creation of short video clips. Again, while the appropriate expertise exists on our campus it took the course team several false starts before locating the expertise. This underscores the need for good technical support before embarking on an early follower project. In addition this experience shows the importance of having a clearinghouse on campus for non-standard course-related technology requests where faculty can be pointed to the appropriate technical support. Fortunately UB now has an Educational Technology Center that will soon be able to fulfill that role.

3. Adequate course management software
   A third prerequisite for a successful early follower project is the existence of adequate course management software. The experience of the UB course team suggests that this prerequisite is close to being fulfilled. Many of the existing course management systems have been designed for use in small courses, where faculty or students enter much information by hand. What is needed is the easy integration of testing software from publishers, the ability to import grades from such software, more flexibility in the grading and grade reporting functions, and more flexibility in the file structures. What is hopeful is that while no single course management system currently has all of the necessary features, each required feature is available in at least one system. This suggests that the full functionality will be available soon in many systems.

4. Appropriate course specific software
   The final prerequisite is the existence of appropriate course specific software. For computer fluency courses there is a wide range of effective software, which enabled the UB course team to select the best materials for their specific course. In this area, much of the software is commercially available from textbook publishers. In other areas the software may be available from other faculty. The National Science Foundation and other organizations maintain web sites with pointers to freely available courseware [11]. While such software developed through NSF grants and other types of federal or foundation support is generally of outstanding quality, the maintenance and updating of such software can turn out to be too burdensome for the associated faculty to continue it's maintenance. Another alternative is to purchase software from one of the companies that have been spun-off from universities to provide on-line courseware and course supplementary materials.

Significance:

The importance of this work goes beyond the effect on a single course at a single institution. This work can serve as a model for other early followers within the university as the course team members communicate their experiences to other faculty. It can also serve as a model for faculty at other institutions who wish to be early followers and create pedagogical usage of technology that is scalable. By demonstrating that technology enhanced courses can be created that don't require significant extra faculty time and significant additional infrastructure costs, the early follower model becomes a model that can be adapted by an increasing number of faculty members. In addition, working on restructuring courses with an increased use of new technologies, where both the pedagogical considerations and the costs of instruction are considered, creates a positive culture of change that can then spread to other aspects of the university.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0012

Title: Evaluation of Scalable Applications of Information Technology to On-Campus Learning

Author: Harry R. Matthews, Barbara Sommer, Michael Maher, Curt Acredolo, Arnold Ho, and Richard Falk

Organization: University of California--Davis

Year: 2000

Abstract: The University of California, Davis, is transforming large general education courses in a cost-effective way that maintains high academic standards in the face of rising student enrollments. Two multi-year pilot projects have demonstrated the feasibility of using rich on-line learning environments to reduce the dependence on formal lectures. This resulted in more opportunity for interactions in small groups and reduced the constraints of lecture hall capacity on student enrollment. Evaluation of 10 more classes distributed across disciplines by a multidisciplinary group of faculty and staff funded by the Mellon Foundation has three components: student learning, cost, and user profiling.

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Evaluation of Scalable Applications of Information Technology to On-Campus Learning

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The University of California, Davis, is transforming large general education courses in a cost-effective way that maintains high academic standards in the face of rising student enrollments. Two multi-year pilot projects have demonstrated the feasibility of using rich on-line learning environments to reduce the dependence on formal lectures. This resulted in more opportunity for interactions in small groups and reduced the constraints of lecture hall capacity on student enrollment. Evaluation of 10 more classes distributed across disciplines by a multidisciplinary group of faculty and staff funded by the Mellon Foundation has three components: student learning, cost, and user profiling.

Introduction

The addition of on-line supplements to courses may improve student learning although that has not always been shown but it does so at the cost of increased faculty time and institutional resources. How can information technology improve education in a cost-neutral way without compromising learning?

At UC Davis, demand exceeds available space in many classes required for graduation, and many general education (GE) classes fall into this category. These are known as "impacted" courses. Enrollment has outgrown our classrooms although faculty and teaching assistant numbers are, to some extent, keeping pace with enrollment growth. Large classrooms cannot be constructed quickly enough to solve the over-enrollment problem. Building new classrooms is not a short-term option and is also expensive. Moreover, some have questioned the pedagogical value of building ever-larger lecture halls. Some UCD classes already accept enrollments of 500, and most have enrollments of around 200, reflecting the large classrooms available on campus.

Several prototype projects at Davis have explored alternatives to larger lecture classes and two of these have coalesced into a campuswide initiative funded jointly by the administration through the Provost's office and the Andrew W. Mellon Foundation. The prototypes have shown, over a multi-year period, that on-line course materials can replace lectures without compromising learning and perhaps with enhanced learning for the majority of students. The paper will demonstrate the rich learning environments used for the prototypes (involving an Oracle relational database, Cold Fusion middleware, a web server and a web browser) and present extensive evaluation data on outcomes, including traditional examination data, student perceptions assessed in high-yield anonymous questionnaires, and objective data, on how students used the materials available.

The initial stages of the project, including the prototype courses, the subsequent design of a larger study, and obtaining extramural support, required the cooperation of many units particularly the Academic Senate, the Office of the Vice-Provost for Undergraduate Education, the Teaching Resources Center, the Division of Information Technology, and the Office of the Vice-Provost for Information and Educational Technology. Individual faculty members directed the initial stages and did most of the design work.

The leadership now involves full-time academic senate faculty members from Biological Chemistry, Spanish, The Graduate School of Management, and Computer Science with other faculty and staff from the Teaching Resources Center, Human and Community Development, the Office of Planning and Budget, and the Instructional Technology and Digital Media Center. Participating instructors are from art history, anthropology, political science, agriculture and range science, food science and technology, agricultural resource economics, plant biology, psychology, and other areas.

Strategies

We are investigating two strategies that address the problem of static lecture hall size in the face of growing enrollments. In the first strategy, students are offered a choice of taking the class on-line or in-person. Thus, with appropriate faculty and teaching assistants the class can grow beyond the size of the lecture hall. In the second strategy, part of the course is offered only on-line and the corresponding face-to-face lectures are discontinued. This reduces the use of the large lecture hall by this class, making that teaching space available to other courses. Both strategies are being implemented and evaluated in the current project, which involves 11 large undergraduate GE courses.

The first strategy for reducing overcrowding has been tested in a prototype, which was very successful and which is part of the current study. In the first offering of the prototype, more than half the students in this first-year GE course chose the on-line version[1]. The second strategy mentioned above is part of the transformation of Physics undergraduate education undertaken over a number of years by Drs. Potter and Coleman[2], who have shown that this strategy can be successful at UC Davis. Another application of this approach is being planned for Chemistry. These strategies will both be investigated in the current study.

The On-line Environment

In the situation described here, the quality of the on-line experience is particularly crucial. The basis of comparison is the high quality of education now experienced by students resident at the Campus. We need a significant number of students to choose the on-line version of the course. Thus, we have focused primarily on delivering course content in a rich on-line environment. Course administration issues are handled by existing campus facilities on a commercial course management system. The learning environment we are using for many of the test courses can be viewed at http://learning.ucdavis.edu/BCM410A/ .

The pilot course, BCM410A "Molecular and Cell Biology", was used to develop a versatile content delivery system built on a database that is accessed by Cold Fusion[3] scripts through a web server. The production version uses an Oracle database running on a Sun server and the Apache Web server and Cold Fusion server running on another Sun server. These two computers are housed in the campus Data Center, a dedicated, secure, computer facility with "7x 24" support. When the Web site becomes the sole source of essential course content, it must be reliable. Thus, any plan to replace (as opposed to only enhance) in-person lectures with on-line course content must include provision for very high reliability servers and network.

The environment includes frames for graphics (still, animated, video), sound, text, and navigation. The premise is that students will view the graphics while listening to the sound. The purpose of the text – usually a transcript of the sound – is to allow the use of hyperlinks to a glossary, but some students also prefer to read the text as well as, or instead of, listening to the sound. The presence of sound, which contains all the essential information, makes the design accessible to blind students while the text makes it accessible to deaf students.

The most straightforward way for an instructor to put a course into this environment is to have the in-person lectures video-taped and then provide the video-tapes and the visual materials (PowerPoint presentations, slides, overheads, etc.) to a student or staff person who constructs learning modules, typically one per slide, by:

1. *building a JPEG file or animated* Flash file from the provided graphic
2. digitizing the sound from the videotape
3. transcribing the videotape.

The files for each learning module are then entered into the database using HTML forms, and the learning modules are organized into lectures. This can all be done without bothering the instructor but, of course, the instructor has to "proof-read" the product. In addition, it may be necessary to re-record some short sections of sound where inadvertent "mis-speaks" or "audio-typos" occur. Some instructors prefer to re-record the whole sound in a sound studio; others prefer the "live" quality of the original recording. Students like to hear the instructor rather than an unknown voice, because it makes the experience more personal. It is amusing for an instructor to attend a social function with the students' spouses present because the spouses recognize the instructor's voice.

The use of relatively small learning modules provides the opportunity for sharing of modules as envisaged in the IMS project[4] and IEEE standards activity[5]. Additional materials can be added and integrated into the learning environment, such as the glossary, self-test questions, quizzes and other assignments, tutorials, advanced topics, intelligent email, and discipline-specific features. On-line quizzes are useful for encouraging students to "keep up". The system can release a quiz at a pre-determined time, email the students that it is available, and then grade the results and email the students with their individual grades and the grade distribution for the class. It can also release explanations of the questions when the quiz closes.

The system has not been used for graded quizzes or examinations because of the need for proctoring and the need to maintain the grading process as similar as possible between the in-person and on-line person and on-line versions. At this point, the total enrollment in a class does not exceed the lecture hall capacity so that the examinations can be given to all enrollees in person in the lecture hall, as usual. This also provides a fallback in case the on-line version is not working although, in practice, we are finding more migration from the in-person lecture to the Web than vice versa. So, the examinations can be given in-person in the lecture hall, as usual. However, if we find conditions in which the on-line version is a viable alternative to the in-person version, then the University will want to enroll students into the class beyond the capacity of the lecture hall. This will require alternative arrangements for the examinations, such as using non-lecture space or evening or weekend hours when additional lecture halls may be available.

Results from the pilot studies

In a 5-year study of one course, the course was offered as in-person lectures with computer supplements in years 1 and 2 and again in year 5. In years 3 and 4, the in-person lectures were discontinued and students studied from the web-based materials only.

Although this format did release a lecture hall, in years 3 and 4, the primary objective was to change the role of the instructor. Unlike the courses in the current study, this was a required first-year course for medical students who already had bachelor's degrees. In recent years, in our experience, such students have begun medical school with an increasing ability to learn factual material and reproduce it in examinations but a decreasing ability to use higher levels of understanding such as analysis, synthesis and application[6]. The result is good performance on internal examinations and the national USMLE, but a perceived lack of the basic science background when they enter the clinical years. Thus, students complain that their basic science studies are irrelevant to clinical medicine, and clinicians are frustrated by the students' inability to integrate basic science into their clinical studies.

The pilot course, BCM410A "Molecular and Cell Biology", approached this by discontinuing the in-person lectures and requiring the students to learn this material from on-line and other resources, while introducing small-group case-based discussions jointly led by the basic science instructor and a clinician. The results of this successful experiment have been reported elsewhere[7] and are largely outside the scope of this paper. However, a side effect of the design was that the need for a large lecture hall 5 times a week was replaced by the need to find small discussion rooms 13 times a week, which has clear implications for space planning. The issue of most relevance here is the success of student learning on-line. The small groups may have contributed an improvement in motivation, but they were designed to develop students' higher order thinking skills, in a clinical context. The material discussed by the small groups was not closely tied to the course content (much to the dismay of the department[8]).

In years 1,2, and 5 (in-person lectures), about 30% of the students received A grades while in years 3 and 4 (on-line content presentation) about 50% received A grades (Figure 1). While this is not a properly controlled blind study it shows that, in the rich on-line learning environment employed, student learning at least didn't suffer compared with the in-person version of the course and may well have improved.

Meta-analysis of a large number of comparisons of on-line with in-person content presentation results in the "no significant difference" phenomenon[9]. However, this meta-analysis may be burdened by methodological shortcomings. For example, many of the papers and research cited in the analysis themselves cross-reference (i.e., cite similar research and reference each other). Consequently, the amount of research that reaches the "no significant difference" conclusion may be inflated. Moreover, much of the research does not control for extraneous variables, or use randomly selected subjects. Also, the analyzed research sometimes lacks the use of valid and reliable instruments and does not always control for "reactive effects" (e.g., the novelty effect, which describes increased student motivation and interest due to using something different)[9]. Nevertheless, similar to our pilot course, the research does show that for the particular students involved, the online approach was successful.

The indication of better learning in the pilot study with BCM410A may be due to the use of a rich learning environment, unlike many of the studies included in the meta-analysis, and/or the fact that only the course content was on-line while office hours and other student contact occurred in person. This rich learning environment [10] is being used as the basis for most of the 11 other courses in the present study.

Significant insight into the students' views of the on-line content presentation were obtained by *textual analysis of students' free text responses* to the following questions in an anonymous questionnaire returned by all the students: "What did you like about the virtual lectures" (Figure 2); "How could the virtual lectures be improved?" (Figure 3). From this analysis and quantitative answers to related questions we learned that a rich web-based learning environment which is the most popular way for these students to learn, sharp contrast to textbooks, in-person office hours, and other materials[11]. These students did not, however, have the opportunity to compare directly the in-person lectures with the on-line content presentation.

The other pilot course was an undergraduate general education course, like the other courses in the current study. This course, BIS 10 "General Biology", was offered both on-line and in-person in the summer of 1999 and 2000. Students chose either the on-line version or the version with in-person lectures. In both versions of the course, assignments and required asynchronous discussions were carried out on-line using email. In both versions, the examinations were in-person. In this case, the lectures were text-based, without sound, but did include graphics, including some animations and simulations, and self-test quizzes. The examination data showed no significant difference in learning between the on-line content presentation and the in-person lectures.

Both pilots showed excellent student acceptance of the on-line format and learning was either the same or better with the on-line format. These results provide the justification for the larger study that is now in progress.

Cost analysis

Analysis of costs was not part of the pilot studies. Significant costs were incurred, mostly faculty time but also some costs for student assistance and for hardware. The current study has cost analysis added as a major evaluation component. Any claim for a scalable solution to campus problems must include costs analysis as a key component. In this case, the alternatives to the proposed solution to over-crowding of lecture halls include: increased time to degree; renting of lecture space off campus; use of lecture halls on Sunday and/or outside the current 7:30 AM to 9:00 PM times; reduction of general education requirements. Reduced enrollments are politically impossible and building new classroom space is not a short-term solution. What are the relative costs of these alternatives? The current study will address the relative costs of the use of on-line content presentation in comparison with in-person lectures.

The specific aims of the cost analysis are twofold:

1) to estimate the differences in costs between the on-line and traditional lecture course offerings, and

2) to develop a differential costs model for further testing and refinement based on the data collected for the ten courses being studied.

The analysis will focus on differences between on-line and traditional lecture courses without concern for assigning costs to other activities that should not differ (e.g., research). Activities that might differ between the traditional and on-line components are faculty time spent on developing course materials, preparing the course for on-line delivery, giving lectures; and other teaching personnel time (e.g., time spent by Teaching Assistants).

Many of the costs will be joint, that is, costs incurred for both traditional and on-line courses. Faculty probably will spend time developing course materials in both modes. Joint costs will be dropped when computing differential costs. Using data from university records[12], we will obtain estimates of space, equipment, and infrastructure costs that differentiate the teaching modes.

We will compute indirect as well as direct costs. Indirect costs are associated with teaching but not with particular course offerings, for example, attending seminars to improve teaching skills. We predict some differences in indirect costs between the two modes.

A key component of cost is instructor time. We developed a comprehensive, easy-to-use instructor time log by asking seven instructors to generate a list of all their activities with regard to offering a course. Additional items were gleaned from a campus-wide survey[13]. The resulting list of activities was reviewed and sorted into logical categories of course-related tasks. The categories were subsequently checked to ascertain that they were mutually exclusive and comprehensive. Clear definitions for each category were constructed and checked for reliability. Following pilot testing, the log was posted online, to be filled out daily by instructors who are being prompted by an automatic e-mail message, which simply says:

> *Please go to the following URL to update your confidential timesheet for the Mellon project:*
> *http://cloudybay.ucdavis.edu/Mellon/TimeSheet.cfm?Name=Falk*
> *Thanks for helping us collect good contemporaneous data on faculty time.*

The URL brings up a Web form where instructors enter the time spent in three columns, "On-Line", "Traditional", and "Joint", which reflect which version of the course the time was spent on. The time is divided into the following 12 categories.

Direct Time

1. Working with project evaluators:
   Course evaluation for project evaluators, meeting with project evaluators, keeping the time log.
2. Planning the course, developing materials, developing lecture content:
   Developing the course syllabus
   Reviewing textbooks and other materials
   Creating the course structure and content - writing lectures, making outlines, preparing assignments and class demonstrations
   Selecting topics and creating assignments for lab discussions

Organizing reading materials, duplicating readings, dealing with copyright requirements
Locating, duplicating, and organizing media (e.g., scans, photocopies, slides, overheads), previewing videos/films
Preparing web pages (except for online delivery which is category 3 below).

3. Preparing the course for online delivery, reviewing materials for online delivery: *(Course development) Constructing online teaching/learning modules by converting lectures to web format.*

4. Delivering the course in a particular term. Preparing for lectures, delivering lectures, dealing with problems with the online and traditional delivery of course content to students.
   Classroom tasks - obtaining equipment, setting up, immediate preparation for lecture/demos, in-class activities - lecture, facilitation, demonstration. Electronic tasks - consultation, server-related tasks, maintaining website.

5. Interacting with students outside of class.
   Student contact - office hours, telephone, e-mail, after-class lingering, one-to-one sessions, special study sessions, troubleshooting, counseling, tutoring; managing student groups.

6. Evaluating student performance. Preparing and grading examinations, grading papers and projects. Assigning grades.
   Constructing, typing, coding, administering, grading - exams/tests/quizzes, makeup exams, assignments, papers, projects, extra credit assignments
   Record-keeping - grade sheet, tracking assignments, printing, posting, submitting grades
   Resolving - incompletes, medical excuses, emergencies

7. Training and supervising TAs and other assistants.
   TA contact - TA and/or Reader orientation, training, supervising, formal and informal meetings, e-mail, phone contact

8. Other (please specify).

Indirect Time:

9. Attending seminars, reading, collecting materials useful for teaching.

10. Interacting with students that cannot be identified with a particular course offering.

11. Planning and developing materials for future offerings of the course.

12. Other (please specify).

Expenditures:

13. Please describe briefly in box below and put $ amounts in the boxes to the right.

When the form is submitted, the data is entered into an Excel spreadsheet, together with the date of submission. The spreadsheets, one for each instructor, can be easily downloaded by a project evaluator for a quick check of progress. At the end of each course, the data will be imported into a program that is suitable for more detailed statistical analysis.

In comparing costs, we must also recognize that the cost of on-line courses may be initially inflated due to start-up costs. Since the traditional lecture method is well established, it likely requires less time and training to develop and execute. In addition, the on-line courses cannot take advantage of economies of scales, since so few are currently offered. With time, the on-line courses will likely become more cost effective and demonstrate increasingly greater cost advantage compared with the in-person lecture. While the cost of developing the on-line courses is obviously important, we must be aware of short term versus long term costs of using a new learning format.

Conclusion

As David Brown has said: "The jury is in! On-line learning works!"[14]. We agree, provided the on-line learning environment is sufficiently rich, and we have data to support this statement at our own institution. The question now is: "How do we use it?"

Clearly on-line learning can be used by us and by others to reach students who are not resident on our campuses and we are collaborating with our Extension people in this area. However, we are directly interested in large-scale problems on campus where on-line learning can be at least part of the solution. Large-scale implies both scalability of the application framework used for on-line learning and cost-effectiveness. We have identified a particular acute problem on our campus but our data and experience will be valuable to everyone who needs to use information technology to improve education in a cost-effective way.

Acknowledgements

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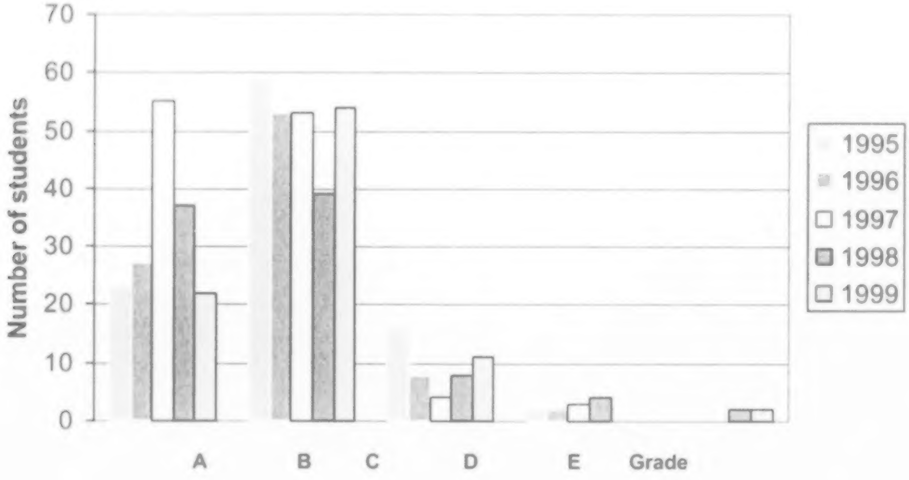
Appendices

Figure 1. Student grades improved with on-line learning.

Student grades for years 1995 through 1999; in 1997 and 1998, the course content was provided through the Web without the in-person lectures. In the other years, in-person lectures were given.



12

Figure 2. Textual analysis of students' free text responses to "What did you like about the virtual lectures?"

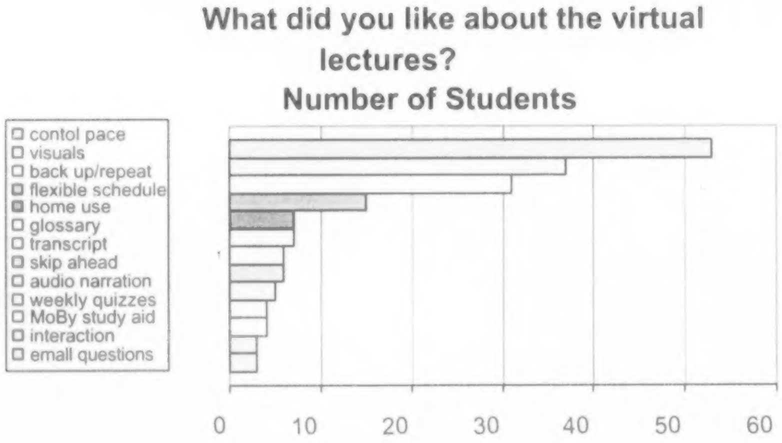
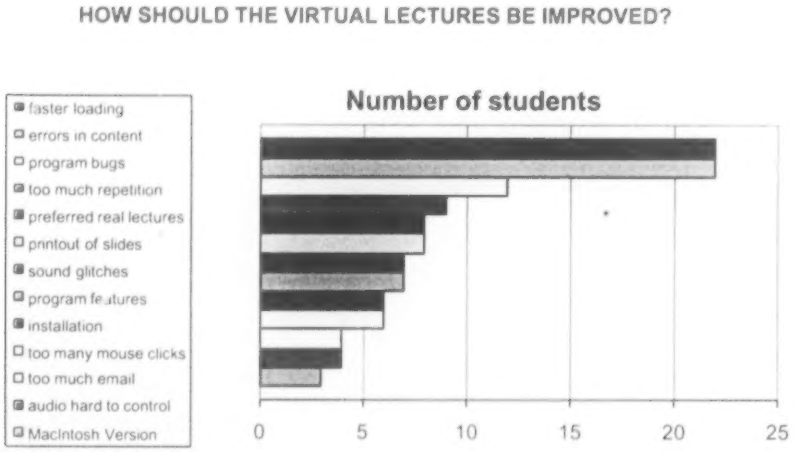

What did you like about the virtual lectures?
Number of Students

Figure 3. Textual analysis of students' free text responses to "How should the virtual lectures be improved?"



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Abstract

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Title: Faculty/Student Interaction at a Distance: Seeking Balance

Author: Kathy S. Gresh and Susan Mrozowski

Organization: The Johns Hopkins School of Public Health

Year: 2000

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Faculty/Student Interaction at a Distance: Seeking Balance

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Abstract:

Interaction between instructors and learners is a critical element in the learning process during an online course (Moore 1993; Offir 2000). The desire to engage the students in meaningful and challenging interaction would appear to require an intensive time commitment by the faculty. This paper will present methods that not only engage the learner but also relieve the stress that time constraints place on the online instructor. In particular, examples from the Internet-based Master in Public Health Program of The Johns Hopkins School of Hygiene and Public Health will be used to illustrate these processes and techniques.

Introduction

Interaction between instructors and learners is a critical element in the learning process during an online course (Moore 1993; Offir 2000). The desire to engage the students in meaningful and challenging interaction would appear to require an intensive time commitment by the faculty. This paper will present methods that not only engage the learner but also relieve the stress that time constraints place on the online instructor. In particular, examples from the Internet-based Master in Public Health Program (iMPH) of The Johns Hopkins School of Hygiene and Public Health (JHSPH) will be used to illustrate these processes and techniques.

Managing students is a demanding and often stressful aspect of conducting a course, whether on campus or online. Faculty can address this issue with the implementation of effective pedagogical tools and the incorporation of careful course design features (Gates 2000). For example, by exchanging ideas, conversing, and challenging the students in well-designed interactive activities, the teacher's attention is less dispersed and the level of unpredictability is reduced (Ibid.). Ideally, incorporating an active learner model, such as a constructivist approach, focuses the students' attention on problem solving and interaction with their classmates, enabling instructors to step aside and use their time to challenge and to guide the learners. The key is to determine the correct balance of faculty / student interaction that is both manageable for the instructor and advantageous for the learner.

Challenges

Faculty apprehension regarding the amount of time that is required to develop and deliver an online course is well-documented (Brigham 1992; Cornell and Martin 1997; Ward and Newlands 1998; Williams and Peters 1997). The very nature of online courses suggests to the learner that the instructor is always available to answer questions or provide comments. Communication tools such as electronic mail, bulletin board systems, and chat software link the students together in a community that exists beyond the traditional bounds of time zones and geographical boundaries. Perceived by the learner as operating within the "rolling present," the instructor can feel pressured to spend large amounts of time interacting with the students (Kimball 1998).

Other time constraints exist for faculty in this process. For example, preparation of materials for course delivery on the Web is relatively time consuming (Ward and Newlands). Working with new online technologies often includes a certain learning curve. In addition, there is the possibility of unrealistic expectations as well as the limitations of the technology to simulate real-time interaction for certain activities and courses (O'Leary 1999; Johnson, 2000).

Solutions

By taking advantage of online technologies, faculty have the tools to design powerful learning environments that ideally incorporate experiences from the students' expertise, and challenge them to solve problems through critical thinking activities (Jonassen 1999; Dutt-Doner and Powers 2000). The key is to ensure that the three basic types of interaction are present in the distance education course: learner-content interaction, learner-instructor interaction, and learner-learner interaction (Moore 1993). Also, a framework for the management of successful online communication is required (Berge 1997; Oliver 1999; Rossman 1999; Sherry, Billig and Tavalin 2000). In particular, the instructor must be able to manage the online environment by maintaining four roles: pedagogical, social, managerial, and technical (Berge, 1995). The result is an online course that engages and challenges the learners but avoids over-taxing the time and energy of the instructor. The following examples from the iMPH degree program at JHSPH illustrate how this balance has been achieved.

JHSPH iMPH Program

The Johns Hopkins School of Public Health developed and delivered its first full Internet-based graduate courses in 1997, after establishing a small distance education division. Experience and student feedback soon demonstrated that our most successful courses were those that included recurrent interaction between faculty and students. Faculty time, however, was already stretched due to research, travel, and on-site teaching commitments. Requesting more teaching commitment, in addition to the time required to develop the online components, was not received well. The division, therefore, began to explore methods of incorporating technology that would create an interaction balance acceptable to both faculty and students.

The following examples of JHSPH iMPH courses illustrate the various strategies used by our division to incorporate Moore's model of the three basic types of interaction while keeping faculty time constraints in mind.

Original Course Development: 1997

The team that developed the first two iMPH courses—*Quantitative Methods* and *Health Information Systems*--included four faculty eager to pursue online technology and a small distance education team (Instructional Designer, Web Developer, and Technical Writer). They began by investigating the various modes available for content delivery and interaction. The online courses developed had to meet the same quality standards as the on-site classes.

JHSPH was already involved in distance education by teleconference and had employed some video/audio. Because the first online public health students would be scattered throughout the US and not always able to access teleconference facilities, teleconference was not considered an option. In addition, teleconference instruction requires the instructor to be present and the goal was to reduce, not increase, the number of classes taught by faculty. The option of simply sending video lectures along with reading material also did not adequately fulfill instructor-learner interaction or the quality standards set by JHSPH. Therefore, the most plausible option appeared to be instruction delivered over the Internet.

Three Internet delivery models were examined for *content-learner interaction*: content on screen with hyperlinks, streamed video, and streamed audio/Microsoft® PowerPoint®. The traditional distance education mode of content interspersed with hyperlinks was considered too impersonal and very similar to mailing out simple printed lecture material. Streamed video required too much bandwidth. Finally, streamed audio with PowerPoint was selected as the content delivery mode because the learners could actually hear the instructor as the content was delivered. Instead of faculty devoting time to authoring text material for web delivery, they instead would convert their overheads or 35mm slide presentations to PowerPoint, record their lectures in an audio studio, and then have their PowerPoint streamed together with the audio. Although this mode requires the faculty member to spend more time in preparation, once complete, revision is not much greater than the preparation for an on-site course revision and the faculty can save time (or use time more productively) on-site by making use of their electronic content. JHSPH surveys, however, show that a successful online audio lecture must be specifically recorded with the distance student in mind. Those recorded in the classroom result in student complaints about receiving second-hand material. Therefore, the first two courses developed included the same on-site lectures recorded and personalized in a studio. The faculty developed their own PowerPoint slides and then these were formatted and synchronized with the recorded audio.

Content mastery for these first two courses also relied on numerous laboratory exercises, normally supervised by teaching assistants (TAs). To adequately match the on-site learner content interaction of these exercises, various plans were implemented. For instance, in *Quantitative Methods*, students read case studies presented online and then answered numerous interactive online questions based on the study. The questions included interactive tables in which various data could be inserted for different variables. Once the student completed the exercise, their answers were submitted and graded electronically. They were able to access and check their answers one week later, after all students completed the exercise. Review questions with immediate electronic feedback were also included. Homework was submitted via email and graded by the TAs (just as it is in the on-site course). In *Health Information Systems*, students were provided with online laboratory problems for which they sent in their answers via email. TAs also graded these.

Because the content was developed before course delivery, faculty time dedicated to *content-learner interaction* during the course was very minimal, limited primarily to the supervision of TAs.

In these first two courses, *learner-instructor* interaction was modeled after the on-site class. TAs acted as the buffer for the first line of questions via email, graded homework, etc. The faculty for both courses, however, felt students should be able to ask questions directly of instructors just as if they were in the classroom. To accomplish this, the division Web Developer created a proprietary program that allowed one-way synchronous audio delivery by the faculty, rather like a radio broadcast, and two-way chat. At specified times throughout the course, faculty would hold discussion sessions, answer questions, or review for examinations. These sessions were quite successful despite frequent technical problems caused by network congestion. If a student could not attend or hear a session, however, they could listen to the archived audio and read the archived chat the next day. The sessions lasted 1-2 hours and required almost no preparation. During a sixteen-week period, the faculty spent approximately 8-16 hours on these sessions.

The TAs did find that online students expected almost immediate responses to their email questions. To make this more manageable, the TAs established online office hours and a guideline that all email would be answered within 24 hours.

An important concern was the ability to recreate a campus community at a distance—the *learner-learner interaction*. An environment that would replicate hallway dialogues and student study sessions was needed. Two software programs were incorporated to help with this goal. For synchronous communication between students, Microsoft™ NetMeeting™ was incorporated and for asynchronous communication, a commercial bulletin board system (BBS).

The learner-to-learner interaction was the least successful portion of the first two courses. NetMeeting continually crashed and students would become frustrated and use the telephone or email. The BBS was used primarily to arrange meeting times, ask questions, and post documents rather than detailed discussions. A real student community was not achieved. Since most of the learner-to-learner interaction relied on student efforts, faculty time was not an issue.

At the conclusion of these courses, students completed detailed course evaluations. Improvements to subsequent courses were based on these surveys and the experience of the development team (faculty and distance education division). In regards to the faculty/student interaction balance, outside of course content troubleshooting, faculty found that they spent approximately one-third more time interacting with students than with a normal on-site class. This was primarily due to the live chat sessions, which they regarded as very valuable.

Subsequent Course Development: 1998-1999

In the subsequent set of courses developed, *learner-content interaction* was very similar to the first two courses developed—lectures delivered by streamed audio/PowerPoint. A variety of laboratory exercises were included. Many of these required group participation, which was challenging over distance and time zones. Once again the students attempted to use Microsoft NetMeeting and continued to have limited success. However, via email, BBS, and phone, they were able to successfully complete their group work. Faculty time was not a factor.

Learner-instructor interaction continued to be accomplished via live broadcast-chat sessions and email (primarily with TA). However, some faculty members also strived (with some skepticism) to create rich BBS interaction between the faculty and learners. They found that once they were able to initially engage the students in a discussion, the discussions grew in quality and depth. Faculty only needed to check the BBS forums routinely, spending approximately an hour a week. Some faculty required that another student first reply to all BBS messages before the faculty became engaged.

Due to the use of the group exercises and BBS discussions, a student community with solid *learner-learner interaction* became evident. In fact, students began to communicate with each other so well that personal discussions had to be curtailed at the beginning of every live chat session.

In some courses, faculty did attempt to personally handle all email communication. One faculty became so overwhelmed that he had to enlist TA support mid-term.

There were also some faculty who chose not to include the live-chat sessions and because of the heavy use of TAs had virtually no personal interaction with the students. The quality of faculty-student interaction received poor rating and many negative comments in the course evaluations.

The course evaluations for the subsequent courses that incorporated the recommended methods of faculty/student interaction continued to receive excellent ratings from students. The primary problems reported were related to network congestion. Faculty time spent *during* online course delivery was actually less than on-site course delivery.

Current Course Development: 2000

Over 20 full web courses have now been developed. Some courses are being offered for the fourth time. Most faculty, initially skeptical, are impressed by the quality of both the live-chat and BBS sessions and have elected to incorporate them into their courses or improve upon past communications. Most faculty set up a series of thoughtful, pertinent BBS discussion questions before the course starts and post them to the BBS as the course progresses. This takes minimal time. NetMeeting was replaced with iChat and is used for synchronous TA-learner communication and learner-learner communication. Although iChat does not have a white board, the communication is stable. To add more learner-instructor interaction without increasing the faculty's burden, primary faculty are inviting guest lecturers to hold special live-chat sessions. Web events directed to the entire iMPH student body also substitute for on-site seminars. Grand Round sessions are also available online.

Faculty are also achieving an improved faculty/student interaction balance by integrating these electronic tools into their on-site and satellite campus courses. For instance, instead of faculty and students traveling to the satellite class three times a week, they instead work online part of the week and meet on-site once week. During these face-to-face classes, they then can concentrate on applying what they learned via online. Faculty also find that they save time revising their on-site classes by using electronic media rather than overheads, 35mm slides etc.

More video is being incorporated online also. For instance, most professors film short 3-minute introductions to courses and lectures (keeping 56K modems in mind). This allows online students to see the faculty, as well as hear them. CD-ROMs are used for longer videos and heavy graphics.

Learner-content interaction is currently a major focus. The faculty and the distance education division are attempting to make content less lecture oriented and more interactive. Various strategies are being experimented with such as making content delivery less linear, including animations, short video segments, and interactive activities embedded right into the lecture material.

In Conclusion

Over the past four years of online course development, JHSPH has found that faculty can maintain quality interaction with learners without significantly increasing the normal on-site instructor-learner interaction time. In fact, often the dialogue is richer (particularly in large survey classes) and, by strategically integrating electronic media into their on-site classes also, they can actually reduce the amount of time spent in the routine work of delivering on-site classes. Recurrent questions can actually be tracked electronically and either used to improve content or posted in frequently asked question areas. Many on-site administrative issues can be handled electronically rather than in office hours. Office hours can be spent on more substantive issues, such as career planning.

Although developing an online course still requires a great deal of time by faculty and distance education staff, creative, strategic planning can result in online courses that achieve a successful and quality faculty/student interaction without undue burden on faculty time.

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Transforming Education Through Information Technologies

Abstract

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Title: From Place to Space: Perspectives on Web Course Management Software Support

Author: Gordon McCray, C. Terry Morrow, and Gary Wittlich

Organization: Wake Forest University, University of Florida, and Indiana University

Year: 2000

Abstract: Panelists from three technology-oriented universities (Florida, Indiana, and Wake Forest) discussed lessons learned in supporting commercial (WebCT and CourseInfo) and home-grown (Oncourse) Web course management software, along with requirements for the next generation of such software.

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Educause 2000

PANEL: From Place to Space: Perspectives on Web Course Management Software Support

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Abstract

Panelists from three technology-oriented universities (Florida, Indiana, and Wake Forest) will discuss lessons learned in supporting commercial (WebCT and CourseInfo) and home-grown (Oncourse) Web course management software, along with requirements for the next generation of such software.

Panel Summary

Three universities, Florida, Indiana, and Wake Forest, have chosen to support particular Web course management software (CMS) tools. Each university differs in terms of size and organizational structure, but all faced the same issue: how to support the transition from "place" to "space," that is, from the traditional teacher-centered classroom delivery of courses to a more student-centered learning environment utilizing the World Wide Web. Each university needed to provide a continuum of Web use, from place-bound course supplements to fully online courses, and Florida and Indiana needed also to provide for courses delivered at a distance. Important to all three universities are scalability, sustainability, flexibility, usability, and utility.

Each university came up with a different software solution to meet its needs: Florida chose WebCT, Wake Forest chose Blackboard's CourseInfo, and Indiana University chose to use its own product, Oncourse. Each institution further developed the strategies and mechanisms required for support of its faculty, students, and staff in the way of training, delivery, documentation, and maintenance.

While their experiences differ, each university has found that its choice of CMS has provided for the needs of its faculty in developing online learning materials. Florida, for example, found that WebCT requires less support for faculty than was originally anticipated. Indiana found initially that Oncourse demand far exceeded support, which made for some short term chaos until an Online Learning Group was formed and support processes were developed. Wake Forest found that careful consideration of user preferences led to unqualified success in its selection and deployment of CourseInfo.

Outcomes at all three campuses have been positive. At Florida, there have been few unfavorable experiences with using WebCT. The primary problems are with students (and faculty) who attempt to use incorrect passwords. Requests for new accounts continue to increase. At Indiana, use and approval statistics have been very positive. In addition, Oncourse has been a key element in coordinating teaching and learning IT support and support center services across all campuses, as well as in driving creation of a unified Windows NT domain name space for all university computer user accounts. At Wake Forest, ease of use of CourseInfo has generated a significant increase in the amount of exploration being undertaken in technology mediated learning by faculty members.

Support best practices of CMS at Florida, Indiana, and Wake Forest include knowledgeable support staff with good interpersonal skills, instructional design consultation, good and current documentation of the software (both online and hardcopy), effective communication with users about changes and updates, and opportunities for user training. Most important, we have learned that including faculty in selection and implementation dramatically improves user acceptance and the creation of an on-line community of users that act as their own support network.

In terms of future needs, developers of CMS systems should pay close attention to three aspects of their functionality:

1. Interface design: While feature laden, most systems are less user friendly than many faculty members would prefer. The interfaces are not always intuitive; in some cases, they are downright cumbersome. Interface design is a matter of paramount importance as these tools become even more feature-packed.
2. Content portability: Faculty members grow increasingly concerned that individual publishers will align with individual CMS systems. Selection of such software by a university might then preclude use of on-line resources provided by a given publisher. Efforts like those reflected in the IMS initiative are appropriate and welcome but, in the end, content must be portable across CMS environments.
3. Conceptual flexibility: Many CMS systems limit instructor flexibility by forcing a specific framework for building and maintaining on-line content. However, increasing flexibility of these products also increases their complexity. Thus there is a need to very carefully balance the feature sets and complexity of use.

In addition, as institutions move to the Internet as the key point of contact for their constituents, it is important that CMS systems provide for easy linking to and integration with enterprise-wide software.

This presentation is sponsored by the Learning Technologies Consortium, a collective of nine universities devoted to addressing issues of support and development of teaching and learning technologies.

Individual statements

Wake Forest University: Blackboard's CourseInfo

Wake Forest is a private liberal arts institution enrolling approximately 3600 undergraduate students. The University has received attention for its ubiquitous computing environment and use of information technology in the teaching and learning process. In fact, prior to the general availability of reasonably robust course management tools, Wake Forest developed internally a course management system in the Lotus Notes environment. As commercially available products began to appear, however, the maintenance and development costs associated with the home grown solution quickly mounted. The decision was made to consider an off-the-shelf solution.

Wake Forest utilizes an elected body of faculty members, together with selected administrators, to consider many policy and adoption decisions that will have direct bearing on faculty and students. This body – the Committee on Information Technology (CIT) – was charged with determining the appropriate path toward selecting a new course management system for school-wide deployment. The CIT determined that, because faculty members are particularly sensitive to changes in standard issue software, the chosen product would remain in place (with periodic upgrades, of course) for at least three years. The process used to select a new course management system, then, must be sufficiently robust to identify a solution with long term viability for the University.

Toward this end a representative sample of the faculty body was selected for inclusion in a rigorous side-by-side comparison of several of the leading commercially available products. These faculty members represented the faculty at large along a number of dimensions. The result was a requirements list that reflected the diversity of the faculty at large. A comparative test procedure was built to test each of the products; all facets of functionality were examined, but special attention was given to usability. Testing was extensive and rigorous. When test results pointed to one particular product over the others, confidence in this result was high. Results of the testing were communicated to the faculty and a pilot program was initiated.

The pilot program was to last for one academic year. A small group of faculty was hand picked to pilot CourseInfo in one or more courses for one semester. Periodic meetings were held to solicit user feedback; that feedback was acted upon immediately, further building confidence in the process. The pilot was expanded to several more users the following semester when initial results were positive. When the product was deployed in earnest the following year, faculty adoption was impressive and has continued to climb. Faculty satisfaction is likewise high.

It is important to note that while CourseInfo proved to be the best solution for Wake Forest, it may not be the optimal solution for other institutions. The important lesson learned for Wake Forest was that an evaluation and selection process that is highly inclusive of several members of the faculty at large tremendously improves the credibility of the process and ultimate success of the project. Furthermore, rigorous testing of products, while time consuming and potentially expensive, leads to much improved outcomes.

University of Florida: WebCT

The adoption of WebCT at the University of Florida has created many often-unforeseen opportunities for enhancing on-line communication. The University of Florida provides a site license for any academic unit to create an independent WebCT server. Very few units have chosen to run independent servers, instead relying on the centrally provided services. The Office of Instructional Resources provides most of the services relating to WebCT. These services include training, call-in and walk-in support for students and faculty, and technical support. Recently, a second bank of servers have been added through the North East Regional Data Center. The addition of the second server bank was intended to provide true 7-24 support. Realistically, there have been few problems requiring support outside of the normal 40-hour workweek.

When WebCT was first implemented at the University of Florida, it was assumed that the primary use would be for deployment of fully on-line academic courses. Subsequent experience has shown that there is more interest in using WebCT to support traditional courses. The primary interest in using WebCT for traditional courses is to provide an easy way for students and faculty to communicate asynchronously. Many accounts are also established for providing communication channels for multi-disciplinary academic projects such as the Partnership for Global Learning and the Video Advisory Committee. Training for WebCT takes several forms at the University of Florida. A number of hands-on workshops of two-hour duration are offered using both MS Windows and Macintosh platforms. Several one-hour introductions/demonstrations are given each semester to targeted faculty groups. A WWW page provides links to training courses available from other institutions as will as providing on-line tutorials developed locally for students and faculty.

Indiana University: Oncourse

Indiana University is comprised of two core and six regional campuses serving 97,000 students by 4300 faculty and 9800 staff. Information technology at IU is the responsibility of University Information Technology Services (UITS), which has five divisions: Teaching and Learning IT (TLIT), Distributed Education (DE), Research and Academic Computing (RAC), University Information Systems (UIS), and Telecommunications (Telecom). Development and funding of IT is guided by a strategic plan (http://www.indiana.edu/~ovpit/strategic).

In 1996, Dr. Ali Jafari began development of Oncourse (http://oncourse.indiana.edu) based on an experiment in delivering a basic chemistry course on the Web. Oncourse was piloted on the two core campuses: in the fall of 1998, at Indiana University-Purdue University at Indianapolis (IUPUI), and in the spring of 1999, at IU-Bloomington (IUB). By fall, 1999, Oncourse moved to production and was extended to the six regional campuses of the University.

Oncourse provides the standard Web course management tool functionalities. Unlike most such tools, Oncourse was designed to automatically create an online course space for each registrar-scheduled course with dynamic updates of class rosters. Oncourse is a strategic initiative for IU and is being developed as a partnership between the TLIT and UIS divisions of UITS, with input from the DE division. Oncourse is positioned as an enterprise solution to support online courseware tools primarily for the mainstream faculty. As more advanced or specialized software is needed, it will be purchased commercially rather than developed in-house.

When piloted, reception for Oncourse was great but support was lacking. By mid-1999, an Online Learning Group (OLG) was formed to oversee Oncourse use, development, and support. Faculty input is sought regularly via such activities as online forums and brown bag lunches. Free Oncourse training classes are offered, documentation is regularly updated, communication is provided via a LISTSERV and a newsletter, and our teaching and learning centers provide consultation and instructional design help. Call-in and walk-in support is also provided by our Support Centers and by our online Knowledge Base (http://kb.indiana.edu), which now contains some 100 FAQs about Oncourse. All core campus requests for support from our Support Centers are entered into a special database (http://eclipse.iupui.edu), are prioritized, and are assigned a number to enable support providers and users to follow progress on problem solutions. This very successful process is now being redesigned to serve all campuses of IU. Based on our annual survey of IT users, Oncourse enjoys a 95% approval rating on the IUPUI campus and a 91% approval rating on the IUB campus. Statistics for the first semester of 2000 reveal 1084 active faculty users, 17,003 active students, 1,374 active courses, 4,728 daily logins, and 250,000+ page hits per day. The success of Oncourse may also be measured by its role as a critical driver of the IU initiative to create a unified Windows NT domain name space for all computer user accounts. In addition, plans have been outlined to develop a group within UITS to help foster assessment of technology use via such means as faculty commissions and use of the Flashlight tools.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0068
Title:	I Can't Define a Great Online Course but I Know When I See One: Lessons To Date
Author:	Lee R. Alley
Organization:	Montgomery College Rockville Campus
Year:	2000
Abstract:	We can now construct a "collective wisdom" from early pioneers' hundreds of successes and failures with online courses-for example, frequent and immediate assessment feedback, frequent student interaction, and intuitive Web site navigation. This presentation will outline the results of an empirical national study called "Criteria for an Excellent Online Course."

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0006

Title: Making the Transition: Helping Faculty to Teach Online

Author: Rena M. Palloff and Keith Pratt

Organization: Crossroads Consulting Group

Year: 2000

Abstract:

Based on the presenter's book, Building Learning Communities in Cyberspace, this session will explored faculty training needs in order to help them shift the ways in which they organize and deliver material so as to empower learners to take charge of their own process and increase interactivity in online courses. The role of IT professionals in supporting this transition will also be discussed.

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Making the Transition: Helping Teachers to Teach Online

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Abstract

Teaching in the cyberspace classroom requires that we move beyond old models of pedagogy into new practices that are more facilitative. Teaching in cyberspace involves much more than simply taking old models of pedagogy and transferring them to a different medium. Unlike the face-to-face classroom, in online distance education, attention needs to be paid to the development of a sense of community within the group of participants in order for the learning process to be successful.

Entering the Online Classroom

Colleges and universities today are in transition. Factors contributing to that transition are economic pressures from mounting costs, demands by the business world for graduates who are able to function in a knowledge society, and greater diversity among students who choose to go on for higher education (Palloff and Pratt, 1999, p.3).

"Universities are feeling the pressure to control costs, improve quality, focus directly on customer needs, and respond to competitive pressures. Information technology (IT) has the potential to solve many of these problems. It can change the roles of students and faculty, facilitate more learner-centered, personalized education, save money through improved business processes and distance education, and expand the scope and content of the curriculum (Horgan, 1998, p.1)."

The response of many institutions to these changes is the development of online distance learning courses and programs. These courses and programs can take many forms including: The creation of a static course on a website which students can access at any time (or course conversion), but which includes minimal interaction among the learners; the development of a course site involving the use of asynchronous discussion as the basis for teaching and learning; and other technological advances such as synchronous chat and streaming audio and video. The more that instructors involve their students in the learning process online, however, the more likely that students will achieve a successful learning outcome. Our preference is for asynchronous learning environments in which students can read material and post to discussions on their own time schedules. The asynchronous environment allows students the luxury of time for thought and reflection on material, which we believe enhances the learning process.

The online classroom is a potentially powerful teaching and learning arena in which new practices and new relationships can make significant contributions to learning. In order to successfully navigate the power of this medium in education, faculty must be trained not only to use technology, but also to shift the ways in which they organize and deliver material. This shift can maximize the potential for learners to take charge of their own learning process and can facilitate the development of a sense of community among the learners.

The shift to online learning poses enormous challenges to instructors and their institutions. Many faculty and administrators believe that the cyberspace classroom is no different from the face-to-face classroom and that approaches used face-to-face will surely work online. Many further believe that all that is needed to successfully teach online is to "convert" the course material. We believe, however, that when the only connections we have to our students is through words on a screen, we must pay attention to many issues that we take for granted in the face-to-face classroom (Palloff and Pratt, 1999, p.xiv). It is our best practices that must follow us into the cyberspace classroom and those practices are the basis for what we term "electronic pedagogy," or the art of teaching online.

Keys to Success

The transition to the cyberspace classroom can be successfully achieved if attention is paid to several key areas. They are: Ensuring access to and familiarity with the technology in use; establishing guidelines and procedures which are relatively loose and free-flowing, and generated with significant input from participants; striving to achieve maximum participation and "buy-in" from the participants; promoting collaborative learning; and creating a double or triple loop in the learning process to enable participants to reflect on their learning process. All of these practices significantly contribute to the development of an online learning community, a powerful tool for enhancing the learning experience. Each of these will now be reviewed in more detail.

Access to and Familiarity with Technology

Many institutions mistakenly believe that all it takes to implement an online distance learning program is to install a fancy software package and train faculty to use it. Certainly, an instructor needs to be knowledgeable about the technology in use and comfortable enough with it to assist a student should difficulty be encountered. An instructor should also be able to construct a course site that is easy for students to access and use (Palloff and Pratt, 1999, p.59). However, the instructor's responsibility must not end there. "Technology does not teach students; effective teachers do (Whitesel, 1998, p.1)." The issue, then, is not the technology itself, but how we use it in the design and delivery of online courses.

A related and important issue is our students' ability to access the course site and successfully navigate it. The most visually appealing course, complete with audio, video, and chat is useless if a student is utilizing old hardware or is living in a remote area with limited Internet access. Consequently, the software used for course delivery should be:

- Functional (i.e., it does what we need it to do which is to facilitate teaching online)
- Simple to operate for both faculty and students
- User-friendly, visually appealing, and easy to navigate (Palloff and Pratt, 1999, p.68)

Establishing Guidelines and Procedures

An important beginning to an online course is the presentation of clear guidelines for participation in the class as well as information for students about course expectations and procedures. Guidelines are generally presented along with the syllabus and a course outline as a means of creating some structure around the course.

Guidelines, however, should not be too rigid and should contain room for discussion and negotiation. "Imposed guidelines that are too rigid will constrain discussion, causing participants to worry about he nature of their posts rather than to simply post (Palloff and Pratt, p.18) ."

It is useful to use the guidelines as a first discussion item in a class. This facilitates students in taking responsibility for the way they will engage in the course and with one another, and serves to promote collaboration in the learning process.

Achieving Maximum Participation

Participation guidelines in an online course are critical to its successful outcome. As online instructors, however, we cannot make the assumption that if we establish minimum participation guidelines of two posts per week, for example, that students will understand what that means. We must also include expectations about what it means to post to an online course discussion. "A post involves more than visiting the course site to check in and say hello. A post is considered to be a substantive contribution to the discussion wherein a student either comments on other posts or begins a new topic (Palloff and Pratt, p.100)."

In addition to being clear about expectations for participation, the following are some suggestions that we have found will enhance participation in an online course:

- Be clear about how much time the course will require of students to eliminate potential misunderstandings about course demands.
- As the instructor, be a model of good participation by logging on frequently and contributing to the discussion.
- Be willing to step in and set limits if participation wanes or if the conversation is headed in the wrong direction.
- Remember that there are people attached to the words on the screen. Be willing to contact students who are not participating and invite them in. Create a warm and inviting atmosphere which promotes the development of a sense of community among the participants (Palloff and Pratt, p.107).

The incorporation of these suggestions into the development of an online course can assist in the promotion of collaborative learning, potentially contributing to stronger learning outcomes.

Promoting Collaboration

Collaborative learning processes assist students to achieve deeper levels of knowledge generation through the creation of shared goals, shared exploration, and a shared process of meaning-making. Jonassen et al (1995), note that the outcome of collaborative learning processes includes personal meaning-making and the social construction of knowledge and meaning. Stephen Brookfield (1995), describes what he terms "new paradigm teachers" who are willing to engage in and facilitate collaborative processes by promoting initiative on the part of the learners, creativity, critical thinking, and dialogue.

Given the separation by time and distance of the learners from one another and from the instructor, and given the discussion-based nature of these courses, the online learning environment is the type of learning arena that, "(a) lets a group of students formulate a shared goal for their learning process, (b) allows the students to use personal motivating problems, (c) takes dialogue as the fundamental way of inquiry (Christiensen and Dirkink-Holmfield, 1995, p.1)."

Engagement in a collaborative learning process forms the foundation of a learning community. When collaboration is not encouraged, participation in the online course is generally low and may take the form of queries to the instructor, rather than dialogue and feedback.

Promoting Reflection

When students are learning collaboratively, reflection on the learning process is inherent. Additionally, when students are learning collaboratively online, reflections on the contribution of technology to the learning process are almost inevitable. "The learning process, then, involves self-reflection on the knowledge acquired about the course, about how learning occurs electronically, about the technology itself, and about how the user has been transformed by their new-found relationships with the machine, the software, the learning process, and the other participants (Palloff and Pratt, p.62)."

The construction of a course that allows these naturally occurring processes to unfold greatly enhances the learning outcome and the process of community building. It is more than reflection on the meaning and importance of course material. The reflection process transforms a participant in an online course from a student to a reflective practitioner and hopefully sets in motion the potential for lifelong reflective learning. Purposeful facilitation of this process involves incorporating the following questions into a course:

- How were you as a learner before you came into this course?
- How have you changed?
- How do you anticipate this will effect your learning in the future? (Palloff and Pratt, p.140)

The reflective process embedded in online learning is one of its hallmarks and most exciting features. If an instructor is willing to give up control of the learning process and truly act as a facilitator, he or she may be amazed at the depth of engagement with learning and the material that can occur as a result.

The Final Transition: Evaluation of Students and Ourselves

Harasim et al (1996), state, "In keep with a learner-centered approach, evaluation and assessment should be part of the learning-teaching process, embedded in class activities and in the interactions between learners and between learners and teachers (p.167)."
In the spirit of collaboration and reflection, evaluation of student progress and performance should not fall to the instructor alone. Students should be encouraged to comment on each other's work. Self-evaluation should be embedded in performance evaluation. Quality and quantity of participation should be a measure of overall student performance. Examination may not be the best measure of student performance in the online environment. In a truly collaborative learning process, concerns about cheating become irrelevant.

Making the transition to the online learning environment means developing new approaches to education and new skills in its delivery. It means engaging in self-reflection as instructors to determine our own comfort level in turning over control of the learning process to our students. It means promoting a sense of community among our students to enhance their learning process. But, most of all, it means abdicating our tried and true techniques that may have served us well in the face-to-face classroom in favor of experimentation with new techniques and assumptions. In so doing, we will meet the challenges of preparing our students to navigate the demands of a knowledge society and, in the process, learn something new ourselves, thus supporting our own quests for lifelong learning.

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EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0023

Title: Managed Chaos: Learning in Technology Enhanced Environments

Author: Meg Scharf and Karen L. Smith

Organization: The University of Central Florida

Year: 2000

Abstract: Learning and information management in technology rich environments is a nonlinear process that teachers cannot pretend to control. UCF's teaching and information management strategies build on metaphors and models borrowed from Dynamical Systems and Complexity Theories to help teachers and others understand learning processes and effectively guide students in complex environments.

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Managed Chaos: Learning in Technology Enhanced Environments

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Abstract:

Learning and information management in technology rich environments is a nonlinear process that teachers cannot pretend to control. UCF's teaching and information management strategies build on metaphors and models borrowed from Dynamical Systems and Complexity Theories to help teachers and others understand learning processes and effectively guide students in complex environments.

Teaching, learning and information management in a technology rich environment is a dynamically different process from the one we THINK occurs in a traditional face-to-face class. Teachers and students have access to unlimited amount of information and infinite possibilities for exploration, discovery, organization, application, interaction and collaboration. The learning and information discovery processes changes in response to a variety of variables including the background information students bring to the classroom, their ability to successfully find, retrieve, organize and apply information; and the people with whom they can interact. Attempts to measure learning in terms of linear progress to a single ending point ignores the dynamic nature of learning and ignores the processes involved in learning how to learn through technology.

It imperative that teachers understand the learning and information management PROCESSES. Teachers once assumed they were the sole source of information for a given class period. Now technology has personalized the learning process, opening doors to exploration, discovery, and application process that personalizes the learning experience … transforming it into a personal, active and even chaotic experience. Even in the largest classrooms students can apply information rather than simply receive it using wireless access to the Internet, the proliferation of laptop computers, and the appearance of dynamic reading devices such as RocketBooks, SoftBooks and Microsoft Reader for PDAs.

Teachers must be able to envision the opportunities for acquisition and application of new knowledge that exist because technology has become so prevalent in the learning environments. They must give up the (false) sense of control they have had over the learning process and develop new strategies for guiding students in learning environments that gives students virtually unlimited opportunities.

If they don't, we will continue to meet at national meetings and discuss techniques for closing laptops or otherwise disengaging students from "distracting" technologies so to reduce misbehavior during lectures and other teaching techniques that demand passive behavior and reception.

Use of fractals and the applications of chaos/complexity theory metaphors and models help faculty visualize the dynamics of the learning process as realized through iterations of interactions between people, information, and events. These models also help faculty realize that learning is not a linear process and cannot be constrained by the artificial boundaries and limitations of the traditional classroom-based learning experience.

Through the exploration of metaphors such as phase space, trajectories, dependence on initial conditions, and lagged time teachers reach an understanding of how learning may occur in a dynamic environment and can begin to build guidelines that *expand* learning possibilities rather than constrain them. The result is a system that focuses more on learner needs and depends less on the teacher as the source of all wisdom.

I. The history and definition of the concept of chaos; deterministic chaos examines the development of change over time.
  a. Multidisciplinary
  b. Characteristics of chaos: Non-linearity, dynamic
  c. The role of randomness:
    i. In the processes of learning and knowledge acquisition and management, CHOICES play a vital role.
    ii. The butterfly effect

II. Exercise mapping the role of variables, choices and chaos leading to a decision point in participants' lives.

UCF The Faculty Center for Teaching and Learning and the UCF Library are tracking and analyzing the processes students use for information acquisition, management and application in order to identify strategies that lead to successful learning and those that breakdown. The result has been a faculty development process that has moved faculty away from a lecture/information distribution model to one that actively engaged students in the learning process. Through the use of templates and guidelines, negotiated outcomes, team roles, and phased deadlines, students have begun to accept responsibility for their own learning and are shifting from passive recipients of information to explorers, discoverers and experimenters.

I. Examples:
  a. Students are responsible for knowledge acquisition and management; Instructors partner with the Library and other units on and off campus to create opportunities for students to acquire knowledge; Instructor and student choices are important variables in the process.
  b. Possible choices for students and instructors appear infinite; selection and rejection of information are vital.

II. Exercises:
  a. Construction of a model (using a template) demonstrating student choices and variables for acquisition of content and knowledge.

b. Construction of a model demonstrating instructor patterns for knowledge acquisition.

Some faculty embrace the notion of chaos in the classroom, others fear it. The fractal model opens the eyes of some to the dynamics of learning with technology while it causes others to retreat to a more comfortable approach that limits the types of information and learning activities to which students have access. An analysis of teaching and learning styles confirms that dynamic approaches to teaching and learning is not appropriate for everyone nor for every learning need. By understanding the teaching approaches that support dynamic learning and the type of students who can benefit from this environment we have been able to create learning alternatives and to maximize the use of high tech environments, making the most flexible available only to those faculty who are prepared to use them. We have also been able to better advertise the type of learning that will take place in different classes in order to attract students who can benefit from the opportunities and strategies. One size does not fit all and our understanding of dynamical learning environments has allowed us to increase the diversity of our course offerings, including more that encourage a shift to lifelong learning and information strategies while retaining and improving those that respond to the need for receptive learning opportunities.

I. Exploration: Styles, strategies, and processes

II. Exercises:

   a. Exploration of personal learning strategies and learning processes

   b. Matching of appropriate technologies to strategies and processes

Our interviews with institutions that have adopted notebook programs, studio classroom programs and other technology-rich learning environments have yielded warnings about the "mischief" students can get into when technology can spirit them away from a boring (read "lecture") session. Our findings indicate that by embracing the chaos of the learning and information acquisition environment we can free the learners to learn from each other and from a variety of information sources and models while helping them to develop higher level thinking skills. The UCF model for helping faculty maximize the dynamic learning environment can help other institutions move a way from the philosophy of "shutting the laptop to keep the students focused" to one that embraces their ability to discover and apply knowledge that is not only contained in a textbook.

I. Example: The UCF Model

II. Exercise: Design of personal models that will allow your institution to integrate technology and personal learning strategies WITHOUT chaos

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0065
Title:	Measuring the Effectiveness of Distance Education
Author:	Barbara B. Lockee and David M. Moore
Organization:	Virginia Tech
Year:	2000
Abstract:	How can we determine the quality of distance-delivered instruction? Unfortunately, a popular approach is to compare achievement between campus-based and distance courses. This session will explain the flawed logic behind such comparisons and provide effective strategies for assessing the effectiveness of distributed learning experiences.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0042
Title:	MERLOT: A National Teaching and Learning Network for Faculty
Author:	Gerard L. Hanley, Bruce Mason, and Jessica Somers
Organization:	California State University, University of Oklahoma, and University System of Georgia
Year:	2000
Abstract:	MERLOT, an organization of twenty-three higher education systems, consortia, and institutions, provides digital learning materials to faculty using the Web for teaching. An overview of the organization, the peer review processes to identify high quality materials, and the tools MERLOT uses to build discipline-specific faculty communities will be presented.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0026

Title: PATRON: Using a Multimedia Digital Library for Learning and Teaching in the Performing Arts

Author: Elizabeth Lyon

Organization: University of Bath

Year: 2000

Abstract: The creation and application of a multimedia digital library to support learning and teaching in the Performing Arts is described. PATRON Performing Arts Teaching Resources ONline delivers audio, video, music scores, dance notation and theatre scripts to the desktop via an innovative web-based interface. Digital objects are linked subjectively by users in profiles with different formats and functions, for example, e-notebook, multimedia essay, and synchronised timeline. Metadata are implemented in XML and extended Dublin Core. Rights issues related to digitising multimedia resources are noted and the watermarking of audio, video and images is described in relation to rights protection.

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PATRON: Using a Multimedia Digital Library for Learning and Teaching in the Performing Arts

Elizabeth Lyon
Director, UK Office for Library & Information Networking (UKOLN)
University of Bath
UK

Abstract

The creation and application of a multimedia digital library to support learning and teaching in the Performing Arts is described. PATRON Performing Arts Teaching Resources ONline delivers audio, video, music scores, dance notation and theatre scripts to the desktop via an innovative web-based interface. Digital objects are linked subjectively by users in profiles with different formats and functions, for example, e-notebook, multimedia essay, and synchronised timeline. Metadata are implemented in XML and extended Dublin Core. Rights issues related to digitising multimedia resources are noted and the watermarking of audio, video and images is described in relation to rights protection.

Introduction

We have designed and created a digital library of performing arts materials for the on-demand delivery of digital video, dance notation, audio, music scores, and theatre scripts across a high speed ATM network to the desktop. The work began in 1996 as the PATRON Performing Arts Teaching Resources ONline project (*http://www.lib.surrey.ac.uk/Patron/Patron.htm*) which was initially funded through the UK Higher Education Funding Councils' JISC eLib Programme. The University of Surrey, UK, has supported the follow-on project PATRON2 (*http://www.lib.surrey.ac.uk/Patron2/)* which explored embedding the system within the academic curriculum, and a full operational multimedia digital library service is now being implemented. The potential for the system to provide a contextual learning environment was envisaged at an early stage and this aspect has been developed through the use of "profiles" which are described in more detail below. In parallel, a JISC Technology Applications Programme funded investigation of the role of digital watermarking of multimedia materials PatronMark (*http://www.lib.surrey.ac.uk/patronmark/),* is presented in the context of rights protection.

A Learning and Teaching Approach

The Library-based technical development team worked in partnership with staff and students from the School of Performing Arts (dance, music, and theatre), from the start and their contributions and feedback have been critical to the success of the service. One of the original project aims was to improve access to reserve or short-loan materials such as videos and CDs, and more specific user requirements were investigated via a series of initial focus groups which informed the design of the PATRON interface. Staff and students were invited to comment on the beta version and on subsequent developments, and they have since conducted an evaluation of the working system. Modifications were made as a result of this evaluation; external evaluation was also carried out by professionals in music, dance and theatre and many useful suggestions were made through this process. User feedback has been very good overall and some user quotes are given below:

"useful because it pulls together all the resources for one course especially where hard copy might be limited"
"it's like having a music library in your own room"

PATRON works at two levels: firstly as a digital library delivering resources on-demand to the user and secondly as a contextual environment. We have developed a number of tools for using the multimedia materials to enhance and enable their application by the students and staff on the different courses. These tools have developed from the concept of a "profile" and in most cases, the tools have been created in response to a specific request from a member of the academic staff in the School. The different applications are explained in more depth in the Profiles section.

From the outset, materials for digitisation were identified from selected undergraduate and postgraduate courses in Music including *Repertoire Studies, Style History, General Repertoire Knowledge, Twentieth Century Analysis,* *Orchestration, Renaissance Studies and The Mature Classical Symphony;* and in Dance, *Critical Perspectives, Movement Analysis, UK Theatre Dance and Analysis and Criticism.*

Three specific types of media have been digitised: binary images, audio and video. There is also some text. The images, namely dance notation and music scores, have created particularly demanding conversion problems e.g. originals vary in quality and size, dance notation is often hand-drawn and can be feint, music scores may be reprints so the resolution and contrast can be poor and the application demands that images display quickly, so files must be small but include sufficient detail to enlarge without a loss of quality. These problems have corresponding rights issues which are briefly mentioned in the next section on Rights Clearance.

Rights Clearance

The original project was viewed as a test-bed opportunity for rights holders and licensing organisations in the UK to participate in an innovative experiment to employ digital multimedia materials for learning and teaching in higher education. The approach taken by the project team was one of forging partnerships with the relevant organisations (e.g. Music Publishers Association, Music Alliance) since in order to make digital copies of materials in the UK, permissions have to be obtained from the rights holders. This process has been described in detail in an earlier paper[1]. Rights clearance have been obtained for all materials used in the digital library and an administrative database maintained. We were unable to obtain permissions to use certain works and others had to be substituted – this is not an ideal situation as in some cases specific interpretations of a particular work were required by the teaching staff. It was generally more difficult to identify rights holders and obtain clearance for video material.

Some interesting moral rights issues have been raised: dancers are very concerned with the quality of digitised materials and may not be happy if the images are of poor quality through the file compression process. They may also be concerned at the potential for manipulating their performance once a digital copy is made. The concept of a performance versus a recording is a sensitive area: the performance being an individual and unique work of art in itself. Some artistes do not support the concept of recorded work for aesthetic reasons and may refuse to allow digital copying on those grounds. Where performance is an integral part of the academic curriculum, this may provide problems for the creation of digital libraries to support learning and teaching.

Although software programmes have been developed to create electronic notation e.g. LabanWriter, there is still much that is hand-written. There are moral rights associated with digitisation of hand-written notation: many of the marks are very small and the quality of digitised (scanned) material may be inferior and open to misinterpretation.

Rights Protection

There are a variety of technologies that can be employed to act as deterrents to infringements of rights associated with digital assets, such as encryption and digital signatures involving the use of public and private keys. The PatronMark project investigated the use of both visible and indiscernible watermarking of multimedia materials for authentication and audit purposes. A range of watermarking products were evaluated for use with video, audio and binary images: their robustness, audibility and ease-of-use was examined. A series of demonstrators were set up to watermark PATRON materials on-the-fly in an operational production environment; the effect of watermark content on the effectiveness of the process was tested and the ability of users to interfere with the process was monitored. Results are presented at *http://www.lib.surrey.ac.uk/patronmark/Indexpm.htm*. Although some recommendations were made for marking audio and video, the performance of products for marking images was generally disappointing. In response, a new cross-platform tool implemented as a Java servlet, has been developed which marks images at high speed on-the-fly from a web server. The watermark consists of graphic and textual data which in the prototype are keyed in, and time data which are taken from the server. The program is written so that a plug-in accepts information from other sources, such as session user names and from metadata sources on the server: options include position, image scale and boldness or density. The code has been optimised for speed. Program documentation is available separately, and the servlet is available for evaluation by interested organisations. The Final Report of the project will shortly be available at *http://www.jtap.ac.uk/.*

Metadata Standards and Interoperability

From the outset, PATRON has been developed with an open architecture and to comply with international standards and formats in order to promote interoperability with other systems and browsers. The metadata in PATRON have been implemented in XML based on Dublin Core with extensions which include pointers to time subdivisions, temporal and spatial data types. As a result, a high degree of granularity has been achieved which has facilitated the development of a variety of profile tools which fully exploit the multimedia resources. High level metadata include pointers to distributed resources which may also be embedded within profiles. A generic tool has been developed to automate the generation of metadata in the PATRON schema.

The PATRON System

The digitisation procedures have used a degree of compression which is a balance between achieving acceptable quality and limited file size. Notation and scores were scanned and saved in .gif format with adjustments via Adobe Photoshop for quality. Audio is stored as MPEG 1 Layer 3 whilst video conversion is to MPEG 1. More details of the digitisation procedures are given in an earlier article[2] and more general information is given elsewhere[3,4,5].
It was essential to guarantee delivery of data across the network in order to maintain the quality of the audio and video and ATM hardware was supplied by K-Net. Technical details of the system hardware and software have been listed previously[6,7]; Data conversion and interface development were completed locally.

The PATRON user interface works within a web browser. The design allows the application to be implemented flexibly, with a simply managed layout consisting of a large frame which is primarily designed to cope with vertical pages of notation, and smaller frames for video and audio playing, searching and other activities. Any of these frames can be switched to the larger frame. It is also possible to display two large frames side-by-side e.g. to compare two dance videos or music scores. One of the frames includes a history of the current session with links to previous frames. The PATRON interface is shown in Appendix 1 Figure 1.

The controls for playing video and audio are essentially the same as those on a video or CD player and will be familiar to users. Users can view and listen, move backwards and forwards, change speed, and make selections which can be played repeatedly. In the case of music scores and dance notation it is necessary to cope with a variety of sizes, so the user can zoom in and out, pan around the image and move to the next or previous page by a mouse click or a single key. Users who are watching a dance video or listening to audio and simultaneously following the corresponding notation or score can therefore turn the page rapidly with a single mouse click. To provide direct access to a specific movement, act or page, each work is accompanied by a table of contents which has a cascading hierarchy of hyperlinks which are equivalent to the structural sections of the work and can take the user to a particular page or specific time in a recording track.

Profiles

Whilst some users are simply retrieving listening or viewing course works on demand from workstations in the Library, others are exploring the more creative tools available e.g. profiles. The creation of individual profiles is a unique feature of PATRON: a profile is an annotated list of dynamic links to selected points or sections within a digital resource e.g. a video segment of an opera associated with corresponding pages of music score.

The PATRON profile enables the user to link different media or to mark related elements in the same work and these links can be annotated. The profile provides the student with an electronic framework for constructing a subjective analysis of a music or dance or theatre performance which may contribute to the course work submitted for assessment. A desired link is achieved by the user dragging the cursor on screen at the precise time in a recording or page of a score, to the profile which then develops through the addition of free-text notes and the creation of further annotated links.

The profile remains an open document with links to URLs, it conforms to HTML standards and can be subsequently read in any web browser. The PATRON interface and profiles exploit some of the technical features available in the latest browsers, specifically Microsoft Internet Explorer 5.0, and a combination of ActiveX controls has been used in the players together with Dynamic HTML and JavaScripts.

Profiles can be used in a number of different ways. Links can be made to external URLs such as text from electronic journal articles and to subject-related web sites. In addition, a selection of random links to "clips" from selected video, audio or notation/scores can be saved to a program script within a profile and the program then plays the clips sequentially: we have called this feature

"RadioPatron". It is being implemented by academic staff in Performing Arts who create a profile using this feature, that contains pointers to chosen videos or digital audio tracks from a particular course e.g. Repertoire Studies. The profile is then played and used by the students as a learning tool for recognising set works/themes/movements and a rudimentary self-assessment mechanism is in place.

In another variant of the profile, a synchronised timeline for a work can be created and several formats have been developed progressively:

- a basic timeline whose length represents the length/timespan of the item; events such as a page of a score or a photograph can be dropped onto the timeline at selected times and annotations can be added
- synchronised playing back of the time-based material with the events. Typically this enables the pages of a score to turn automatically as a recording plays.

The synchronised timeline currently requires a creation stage where the expert user turns the pages of a score while the music plays. This event is automatically entered into the profile. On playback, three points of synchronisation are available: linear-based, event-based and timeline-based. These have all been used in trials and found to be valuable tools by academic staff, for example, this feature has been exploited by staff and students working on choreography where precise timing within dance works is crucial for study and analysis.

Other applications of profiles include use as a cueing list of "clips" for display or demonstration within a lecture or seminar, and as a means of creating a "master" critical analysis of a particular set work by a tutor for discussion with students.

At its simplest, the profile can be used as an electronic notebook; at its most complex it can be used to create a rich contextual learning environment and an example of this is given in Appendix 2 Figure 2.

In this screen shot there is a frame displaying text from a chapter of a book on gender and the role of women with links to other sites. This is supported by two videos which are triggered from the lower left frame with some additional script relating to the work.

The PATRON Service

The service is managed and developed by staff within the Centre for Learning Developments (www.surrey.ac.uk/CLD) which is a new organisation within Information Services bringing together strategic initiatives related to learning and teaching which are often (but not always), based on emerging technologies. Ways of streamlining the PATRON service are being considered including automating the creation of metadata. To this end, a tool has been devised which takes bibliographic details of a digital resource input via a web form and automatically generates standard Dublin Core metadata for storage in a database. This is a generic tool which has recently been used in another project to generate DC metadata from bibliographic details of university exam papers to enable students to access them on-demand from a web server.

The integration of the PATRON digital library with a virtual learning environment, Lotus LearningSpace has also been investigated. LearningSpace is currently used to deliver a range of online courses at the University of Surrey. Demonstrators have been created which facilitate access to PATRON resources from within LearningSpace, both with a basic toolset and with the full PATRON application.

Issues for the Future

We believe there is much scope for the further development of PATRON and in particular in the following areas:

- The implementation of new applications of profiles to facilitate additional learning and teaching scenarios
- Tools for managing the creation, manipulation and conversion of metadata including the maintenance of authority lists (work on this latter aspect has already begun)
- Integration of new rights management tools and technologies
- In depth pedagogical evaluation of the use of PATRON

PATRON is also been used in other subject domains and some interesting work has been carried out in developing the application in the area of dietetics using video footage of "patients and clinical staff", "case notes", nutritional information and expert textual interpretation to facilitate interactive learning and teaching programmes for undergraduates in this discipline. The synchronised timeline profile has been utilised and developed further in this project.

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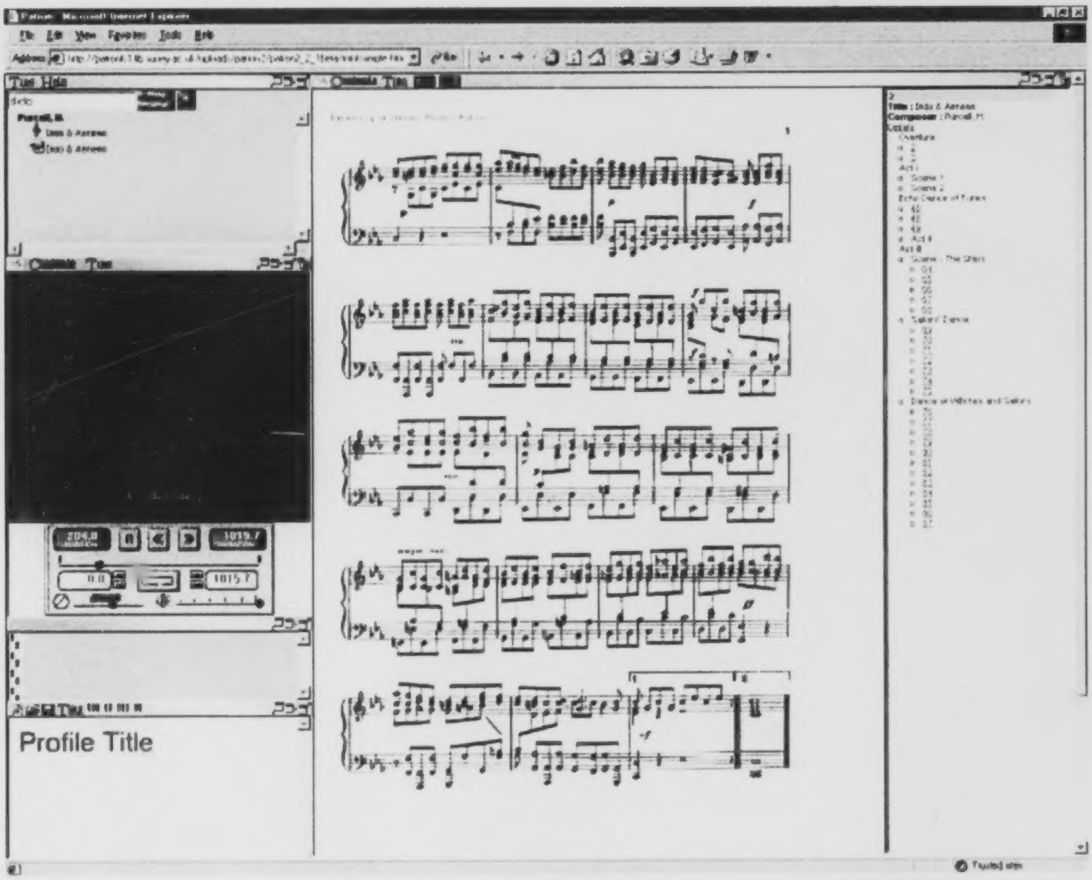
Appendix 1 Figure 1 The PATRON Interface


File Edit View Favorites Tools Help
Title : Dido & Aeneas
Composer : Purcell, H
Overture
Act I
Scene 1
Scene 2
Echo Dance of Furies
Act II
Scene : The Ships
Sailors' Dance
Profile Title

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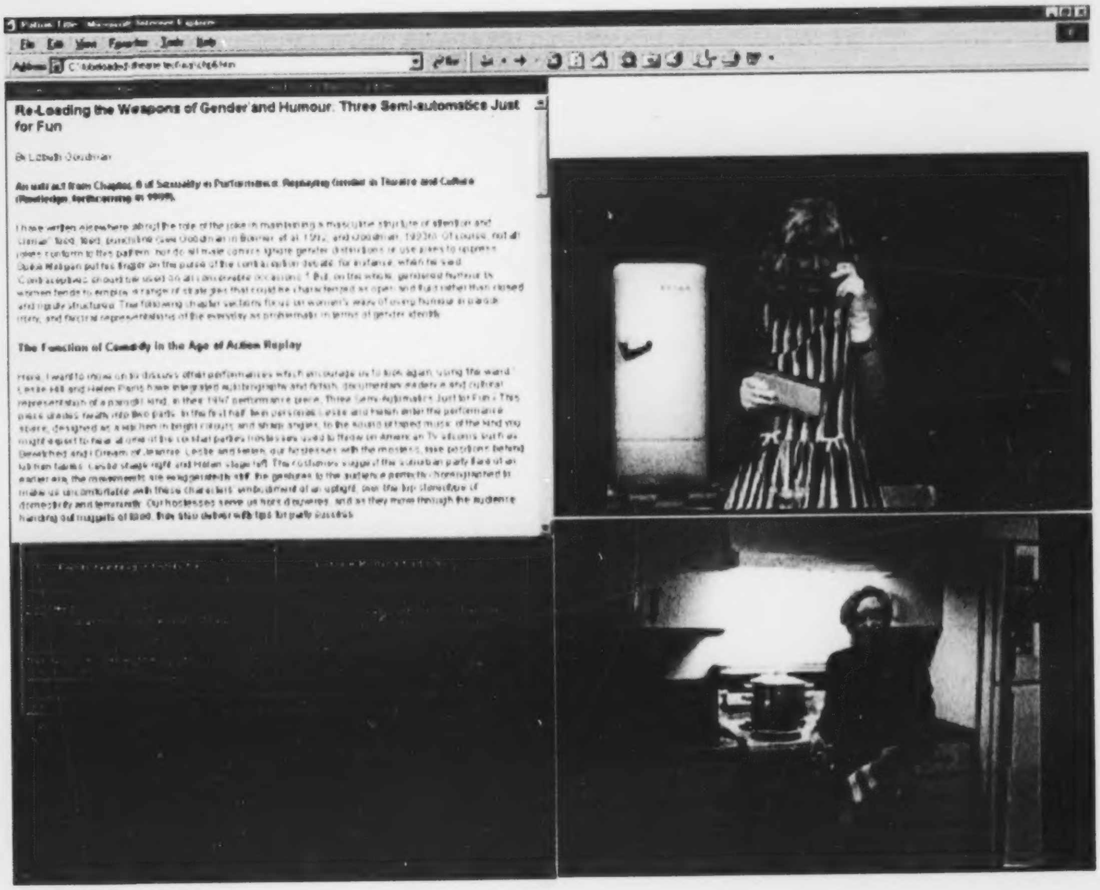
Appendix 2 Figure 2 A Contextual Profile



Re-Loading the Weapons of Gender and Humour: Three Semi-automatics Just for Fun

By Lizbeth Goodman

The Function of Comedy in the Age of Action Replay

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0005

Title: Technology, Teamwork, and Teaching Meet in the Classroom

Author: S. Choton Basu and Sandra E. Poindexter

Organization: Northern Michigan University

Year: 2000

Abstract:

Laptops for students, increased teamwork and group interaction, and teaching as a facilitator of active learning have successfully converged in the classrooms of Northern Michigan University. This presentation will offer practical guideposts for integration strategies, theory, and outcomes assessments.

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EDUCAUSE 2000 October 10-13
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Technology, Teamwork, and Teaching meet in the classroom

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Technology at Northern Michigan University has evolved to a student laptop requirement. Industry's expectation of teams and group interaction continues to increase. Teaching as a facilitator promotes active learning. With planning, these can successfully converge in the classroom. This paper offers practical guideposts for integration strategies, theory, and outcomes assessments.

Background

Interactive teaching paradigms, collaborative classrooms, and instructional technology as individual movements have existed for a decade, with some blending in recent years. A new factor, and the impetus for this study, is the adoption of laptop requirements. Beginning in Fall 2000, all full-time students and faculty at Northern Michigan University, a regional institution with approximately 8,000 students, will have a standardized set of technology tools (laptop, software, and Internet access). Network ports will be available in lounges, study rooms, labs, campus residence hall rooms, and faculty offices. Many classrooms already have a network port and others will be remodeled to accommodate electrical and network outlets at each seat.

Given that this is a mandatory program, accountability for the cost will be demanded by students, parents, and those who fund the university. For these initiatives to be perceived as valuable, faculty will be pressed into successfully integrating the laptop and network infrastructure into their course content and delivery. These are significant paradigm changes; faculty will need models and an idea of what can work and when to use various techniques. The point of this study was a reversal of a traditional lecture-based classroom (80% lecture / 20% interactive) to one of collaborative learning and interaction (20% lecture / 80% interactive). Various types of technology, including the laptop and Internet, were intensively integrated both in and out of the classroom to facilitate the learning process we are calling the 20/80 model.

Environment of the Study

To document approaches to these paradigm changes, a study was undertaken for the 1999-2000 academic year. Seven sections of three on-campus Information Systems (IS) courses, over 100 students, and two professors were involved with the yearlong project. During class, students always sat at group tables with two-four teammates facing each other. One or two laptops at each table were regularly used in team exercises. The instructor facilitated the work by moving around the room as a consultant. Teams were also urged to consult each other. The results of the exercises were e-mailed to the instructor during class, sometimes merged together at the instructor station and the solutions considered on the screen. The files are saved and posted to a web site as solutions for later downloading. The interactive exercises varied in software used and focus of material, but the laptop and technology were emphasized as resources as well as productivity tools. The interactive portion of the course consumed 80% of classtime, lectures only consisted of 20% of classtime.

Role of Technology

Too often technology is deployed without the building of purpose or consideration for appropriate use. Students quickly determine whether paper and pencil would be more appropriate for a particular task and claim technology is being used just for technology's sake. In this study, the goal was to shift the focus from "finding ways of using technology in education," to asking "what learning outcomes do I want for this course" *followed by* "can technology help me reach those goals?" Some specific technology uses applied in the study included:

Presentation software. Some lectures were voice-annotated presentation slides that students viewed before class to summarize text materials. Other lectures were downloaded at the start of class and students followed along on their laptops.

Communication client software (e-mail, chat). To connect the students to instructor and students to students online routes were used. Rather than making students more isolated, out-of-class email appeared to open up an avenue for shy students and equalized their participation grade. Chat rooms were used by a few groups (primarily commuting students) as a sort of virtual team meeting place.

Electronic assignments. Most assignments were done in digital form and emailed to the instructor as attachments. The sending member copied all team members on the email. The assignments were usually graded in an electronic fashion by inserting comments directly into the document and returned via email. This method gave every person a copy of the team's submitted and graded document. This also freed up class time previously used for collecting and distributing papers.

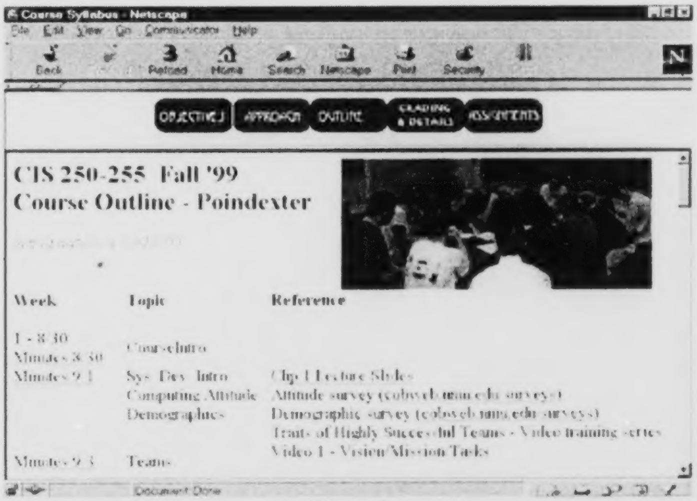
Internet as a resource for research and current materials. In the study we did not assume students knew how to effectively conduct research on the Internet. An in-class exercise required students to select a topic, locate relevant and valid information sources, and consolidate it into a summary statement.

Server space allocated to teams for team work. Many documents written for the classes became too long to email as attachments, but document sharing continued using university-provided server drive space.

Laptops. For in-class interactive exercises for research, decision-support modeling, documenting, and querying shared laptops were the standard tool. Students downloaded the needed files from the class website or visited web sites to collect data, then worked on the exercises during class in teams. Whether there is one laptop per team or per student, having them available has made it easier to conduct some of the interaction exercises in class.

Digitized pads for note-taking. Students in the study found little use for these machines and preferred to take notes directly on their laptop or using paper. These tablets were a prime example of using technology without a firm educational goal; more thought should have been given to the course objectives of collaboration consensus before introducing the technology.

Digital camera. Photos (Fig. 1) were occasionally taken during class group time and posted in the class website. The purpose was to promote student ownership and involvement in the class, and to encourage students to frequently visit the website.



CIS 250-255 Fall '99
Course Outline - Poindexter

Week	Topic	Reference
1 - 8/30		
Minutes 8/30	Course Intro	
Minutes 9/1	Sys. Dev. Intro Computing Attitude Demographics	Chp 1 Lecture Slides Attitude survey (cobweb.mun.edu surveys) Demographic survey (cobweb.mun.edu surveys) Traits of Highly Successful Teams - Video training series Video 1 - Vision/Mission Tasks
Minutes 9/3	Teams	

Figure 1

Detailed course websites. Providing a clearinghouse for all outgoing materials, historical archive, current activities list, and minutes taken by students on a rotating basis the website played a communications role. (Fig. 1)

A quick observation about this list is that these technology items are not particularly new or unique and often used by many instructors. The differential factor for the study is how extremely well integrated into the classroom they became—an integral part of the solution.

Having a technology-friendly classroom helped significantly. In order to utilize teams and technology, our minimum room configuration included an instructor computer with data projection and Internet connection, and movable desks to form workgroups. While interactive teaching can work in most classroom facilities, it may have significantly helped to redesign a room for this purpose. A grant was received to replace individual desks and long, narrow tables with sets of tables for teams of four. Seven laptops were purchased, one per table, with electrical outlets and network connections placed near each table. The intent was to enable software usage and Internet access during group exercises for research and instant file sharing.

By facing each other rather than the instructor, students were more active and more willing to risk an error with only a few peers listening; the instructor station was minimized as a focal point and source of knowledge. Tables also provided adequate workspace for groups to use laptops, spread out working material, and have a place for food that was often shared by the team. Some exercises required large sheets of paper to capture a team solution.

The Role of the Team

There are numerous examples in academia of the team approach. Traditional teaching tends to view teams as a group of people working together on a common objective, often merely grouping students to collaborate on a paper, project, or assignment outside of class, hoping for the best. A prominent complaint voiced during the initial meeting period regarded a lack of knowledge of team operations. One student captured the negative opinions by stating, "A lot of my instructors say they want me to work in teams to do projects because it's important, but no one ever teaches me how to work together in teams and it usually ends up being a frustrating and unproductive experience."

Teamwork in this study was defined to be a constant and conscious effort on the part of team members to work with peers as an effective and integral part of the learning, thereby forming "real" work teams. The instructor served more as a coach and facilitator than lecturer. A substantial amount of classtime was dedicated to the importance, functions, and dynamics of teamwork. It is important to note that 20% of the final grade depended on this type of classroom participation activity and their progress in reaching goals. Some of the main items covered were: establishing team vision/mission/strategies/rules, conducting effective meetings including group decision making tools, handling conflict, and understanding different personality types and learning styles.

Teams were created based on Myers-Briggs[1] temperament sorting, Kolb[2] learning styles, a generally available meeting time (morning, afternoon, or evening), and GPA. Some may disagree with this psychological grouping, but the study found slightly fewer team problems than previously experienced. One explanation is that temperament types permitted well-rounded teams instead of a random selections of all introverted, all procrastinators, or all leaders. Once established, the teams identified the strengths and weaknesses of their members. The groups discussed these results within the group and itemized ways they intended to help each other overcome their weaknesses. Team members were also asked to take inventory of their technical knowledge, then agreed to cross-train each other throughout the semester. As a secondary outcome of the classes, more students showed more improvement in their self-confidence and technical skills due to peer learning.

It also was observed that teams thrive when we established competition between teams and rewarded them with recognition or prizes, e.g. miniature candy bars. Several classroom exercises required teams to exchange ideas, collaborating and consolidating on a joint solution. This expanded the peer-to-peer network. Students were encouraged to bring food to class to remove the intimidating "sit quietly" mentality and leads to a more casual atmosphere, fostering dialog.

A series of videos on teams were used to help the students create their own team operating rules. It included discussion on goal setting and conflict resolution, historically the major problems in student teams. Examples of negative reinforcers created by student teams were denying assignment credit to a group member who had missed class without a valid excuse and requiring an unprepared group member to apologize before the class. Positive reinforcements include buying a soft drink for a team member whose job was well done or a sense of pride gained from sharing a skill with a teammate. These types of behaviors allowed teams to flourish and not be reduced to frustration when other members were not participating actively. Initial feedback and observation show that some teams were more bonded and performing at a higher level compared to teams in traditional instruction classes.

The Role of Teaching

In an interactive learning environment, course content objectives still had to be met, but lecture took a backseat to team exercises and experimentation as the primary course delivery. Outside of class, students were expected to read, outline, or review textbook and reading materials. Only the most complex items or items questioned by students were covered with an actual lecture. Class time was now free to do graded group assignments, case studies, and projects where diverse solutions were generated and shared. This led to some excellent critical thinking and problem solving. An attempt was made to utilize some interactive exercise in every class period.

The first few meeting periods of the studied classes were spent familiarizing students with the underlying philosophy of this teaching and learning approach (Appendix A). This was achieved via discussion, a small lecture component, an instructor philosophy statement, and an interactive exercise. This exercise (Appendix B) asked the students to define an interactive classroom based on their perception and compare it with other classes, followed by a questioning of the merits of this teaching approach over traditional teaching models, and addressing anxieties that might exist. During this session the instructors identified the goals, rules, and direction of the course. In some way, this allowed most of the students to align their mental models to the one presented by the instructor and alleviated some doubts and anxieties. In earlier unsuccessful experiments with the interactive team approach, an invalid assumption was made that students would automatically understand and shift to the participative learning style. This error was corrected in the current study.

Three examples of interactive class time exercises will be described here to illustrate this approach. In these exercises, the instructor's role is to move through the room consulting with teams, providing suggestions, and occasionally bringing the class together for common issues.

Consensus decisions. A decision needs to be made as to the best alternative for an IS project. Pros and cons are discussed in the class, then among the teams. Each team downloads to their laptop a ranking spreadsheet prepared with weighting and tallying formulas, enters in their choices, and views the resulting tallies. These files are emailed to the instructor and merged at the instructor station into a consolidated tally and all teams given a chance to explain their ratings. Teams may then change their ratings, repeating the cycle until there is consensus.

Summarizing and presenting. Students are assigned websites to read and questions to consider prior to class. In class, teams consolidate their answers into one document that is sent to me. Teams are then assigned one question and given 20 minutes to prepare PowerPoint slides that will depict their answer. These slides are merged at the instructor station and a spokesperson from each team comes up to explain the team answer.

Research. A current IS topic is brainstormed in class by the unit as a whole. A list is typed at the instructor station based on student identification of issues to investigate on the topic. Teams of students download the list immediately and begin in-class research on the Internet to locate the needed information and determine its validity.

Whatever the exercise, there is an absolute expectation that outside readings and text materials have been read prior to class. Sometimes testing for new knowledge was conducted by checking for terminology at the outset of some class period. Post knowledge was assessed by asking students to write down one thing they learned from that class period or asking teams to develop summaries of materials into presentation slides during the class period. Students are graded on their team's output for the class and their interaction in completing it, as well as on their individual participation. Students very quickly recognized they must come prepared because the class begins with some type of assessment of their knowledge and preparation. It should be noted at this juncture that lecture slides for the class are made available (including voice overlays prior to the class via the course website). The issue of a classroom full of passive, unprepared students did not often exist after a few meeting periods.

Results

Based upon the initial interactive exercise that defined an interactive classroom, anxiety was evident at outset. This is a new learning paradigm that takes some student adjustment. As one student worriedly stated, "you've taken away everything I know about studying and I'm not sure how to react." In part, student evaluations reflected some confusion as to purpose and exactly what was expected on projects.

To quantify the first semester's results, a 27-question exit survey was given in the fall semester to 80 students with key points shown in Table 1. There was very little deviation in the survey scores. Students felt positively about the experience.

Table 1. Exit Survey Results

Question / Issue	Mean (5 high)
Overall rating of interactivity	4.15
Using laptops in class to obtain materials, do exercises, and immediately post work is an effective use of the laptop technology that should be promoted in other NMU classes.	4.15
Class minutes, taken by class members, is a good way to summarize a class period's activities and provide reference and clarification for later review.	4.28
A test *should* be given for *each* one or two chapters, even though it reduces the class available time for discussion, exercises, and lecture.	2.88
A dynamic (changing) course outline web page encourages students to more frequently reference the outline than a printed outline distributed on the first day of class.	4.09
Submitting assignments as email attachments is better than handing in paper copies at class	4.20
Receiving electronically graded (comments in a different color font) assignments via email is a good way to get and store graded materials	4.08
Assuming the reading material is clear and complete, college students can learn most (60-80%) of course *content* knowledge (terms, skills, steps, etc.) by diligently studying the text and assigned outside readings.	2.83

In summary of that data, on a scale of 1-5 with 5 high, an average response of 4.15 was given for questions relating to interactivity. When asked to state a percentage breakdown for the class grade between individual work and teamwork, the response was 35% individual and 65% team. This was in contrast with voiced objections to the initial 40% / 60% breakdown stated on the syllabus. Students felt at the outset that 60% allocation was too high for the team grade, but later wanted more point allocation to teamwork. Students became accustomed to the integrated technology and rated several features quite high, such as 4.28 for the posting of student-taken class minutes.

It might be presumed that all students enter the course with high levels of computing competencies and willingness to use technology in all ways. This is not the case and peers helped each other learn new skills and overcome computer anxieties. The laptop became a centerpiece for the class periods, partially due to instructor emphasis on exercises that effectively made use of them. In one section, at the outset of the semester two students brought in their own laptops. By the end of the semester, 12 other students had purchased their own laptops and brought them to class after seeing their benefits.

Two striking measurable outcomes, scores on tests and final grades, were detected. One instructor was able to compare scores against two prior years of student data. Though not controlled for student sample differences, means for both test scores and final grades had slightly increased and standard deviation had decreased. Since assessment questions had not been made easier, one plausible conclusion is that peer learning was removing the gap between the high and low scores, and pulling everyone up slightly. Students seemed to agree this was likely as they had relied on their peers for help in studying for tests and felt comfortable asking their peers for clarification on text material during class time.

Three written comments are provided here to illustrate the general positive feedback. "I can't believe how much I learned in this course. I went from having very little knowledge of what a systems analyst does to developing a pretty good understanding of the whole process." From the standpoint of increased learning, attendance, and participation: "I paid attention and learned much more from the interactive lecture than if we had had a more traditional one." And on retention: "Combining hands-on with text is the best way to retain knowledge and not say [next semester] 'what did I learn [from last semester]'."

Once the pattern and pace were set for them, student expectations of the instructor also elevated above those of peer instructors, sometimes to an unrealistic level. It is important for the instructor to accept and deal with potential personal issues that arise from this type of teaching approach. No longer the star performer protected by an invisible barrier at the front of the room, the instructor becomes vulnerable. Once students were encouraged to be active, thinking members of the environment, they began to challenge and question the instructor and the tasks at hand. Questions were continuously asked of the instructor and each other, resulting in a classroom where students were prepared for discussion and it was safe to voice an opinion. "Make work" exercises were quickly rejected, therefore all assignments began with a learning objective that had relevance and was clearly explained and defendable. The "because I say so" or "I know best" attitudes had to give way to "let's explore together" and a respect for their need to understand motives. Reaching this level of critical-thinking was both rewarding and threatening. If students were expected to come to class well prepared, the instructor was given no tolerance to fail in this area either.

Conclusions

The study is still underway at this writing, but the general consensus is one of student preference for this approach with some vocal dissidents. However, a great deal of effort was put into shifting students into a new learning mindset. Lessons learned from earlier experiments proved that time spent explaining and retraining were needed. The belief that a computer literate generation will automatically adopt and thrive in a technology-rich educational environment is, we believe, proven a myth. In addition to grade records and student evaluation comments, data was collected using three different instruments: demographic, pre-attitude, and an exit survey. We found the approach works better in some settings than others—three sections of the same course varied in class meeting time as a comparison. The more often a class meets, the more successful was the adoption of technology, teamwork, and interactive learning. A thorough data analysis will be done during the summer after completing three remaining sections. Demographic and attitude data have been collected from the students in these courses that will permit correlation testing of multiple variables. During the fall semester of 2000, another instructor will be brought into the mix as well as two additional courses.

Some questions we hope to address in additional research relate to diffusion—"Is this approach applicable to all types of courses, and if not, where will it work?" and "Will it work for all types of instructors and students?" Other questions relate to implementation requirements—"Is it possible without the laptops and other technology aids?" and "How essential is the redesigned classroom facility?" Finally, there are issues of the future—"Where do we see this road taking us?" and "What are the future ramifications of this teaching model?"

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[1] Kolb, D.A. (1981) Learning styles and disciplinary differences. In *The Modern American College*.

Edited by A.W. Chickering and Associates. San Francisco: Jossey-Bass, 232-255.

[2] Keirsey,David M. (1998) Keirsey Temperament and Character Web Site [Online] <http://www.keirsey.com/cgi-bin/keirsey/newkts.cgi>

Back to text

Appendix A
Teaching and Learning Philosophies

My basic role as a professor is to teach in a way that my students are able to learn. Sounds reasonable, but there are some unknowns here. For example, what is it I'm teaching, what are students learning, and what are the students' roles?

Information systems is one of the fastest changing disciplines and trying to stay abreast of new technologies is a strain for both students and faculty. While those technologies have to be covered in the curriculum, my belief is to *emphasize the learning process for new technologies rather than the skill of the new technology*. Once in a professional position, an employee is valuable if they are able to locate resources for new trends, analyze them for relevancy and permanence, train themselves in the new skill, and know how to appropriately apply that new skill. In my classes, it's less important to memorize that a particular menu option is on the fourth menu, three down, in the submenu than it is to realize that scanning the menu looking for possible options or using the Search feature under Help will quickly produce the needed path. The next version of the software may rearrange the menu, but no one can take away a skill to scan or search.

In general I plan a mixture of *30% lecture (on just the hardest course content), 60% interactive class exercises, and 10% class open Q & A.* However, since different people learn better in different way, I use personality and learning type assessment tools and student conversations to help me fine-tune my teaching methods for a specific class. For example, if a class is quiet with few questions then I increase class exercises and if there are lots of questions it may indicate a need for a few more structured lectures. At the college level, students generally can self-learn much of the book material outside of class, but need more help in applying the material to situations. Assignments will often begin as a class exercise, assuming the book material has been covered outside, after students have a chance to clarify concepts with a Q & A. *In short, class time focuses on asking and doing.*

For years, I have believed that *effective teamwork is a critical skill to obtain.* For the same number of years, students have resisted teamwork for reasons you can all list. To overcome some of those criticisms, more classtime is available for group projects and training for teamwork is given early in the course. The JH226 classroom is equipped with group worktables with laptop computers that will be used during in-class projects. A lecture might be paused and each group asked to give something a try or to find out an answer.

While my classes aren't run as democracies, the student role is hardly a passive one. Schedules are planned with flexibility, assignments sometimes get modified as they do in a job setting, and students have to be prepared for the in-class project atmosphere. Constructively stating frustrations and needs should be possible on both sides of the table.

Return to text

Appendix B
Exercise on the Interactive Classroom Style

Opening day exercise in which students seated independently are asked to write out answers to questions

2 – 4.

1. How many have taken classes using an interactive classroom approach?

2. Write down a definition of the term "interactive classroom". Compare that with 2-3 other people and agree on a common definition.

[possible answers]

- Less lecture
- More outside prep
- More like a lab/business
- Student-student class activities
- Interactive with instructor

3. What mental model will you as a student need to best fit this approach? Create a list of the model's features.

[possible answers]

- Listening skills
- Communication skills
- Knowing what you understand and don't and how to solve that
- Compromising skills Willingness to learn

4. Think about your initial reaction to this style… positive (intriguing, challenging, interesting), negative (fear, distrust, undesirable) and think about why. Debate this with 2-3 other people.

[possible answers]

- Scary
- Selective passiveness
- Lots of work
- Fear of lack of knowledge
- Nervousness
- Problems with group members

5. How many of you know the names of the people you have just interacted with?

[generally there is a mixed group of those who have asked names and those who were on the task alone]

Return to text

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Abstract

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Confessions of a Guerilla Technologist

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Faculty development professionals have much in common with guerilla warriors, and should consider adopting at least some of their tactics and strategies to facilitate the change process in higher education. This paper describes the characteristics of guerillas, discusses their tactics, and explains how these tactics can be utilized to promote the integration of technology in the teaching/learning process.

The integration of technology into teaching and learning has become a topic of concern to those involved in all levels of education, from preschool to postsecondary. Unfortunately, many impediments to the effective use of such teaching tools remain, mired in generations of tradition and exacerbated by a lack of information and understanding. Faculty development professionals, charged with promoting the utilization of a variety of instructional technologies, may be unaware of the resemblance between their task and that of some rather unlikely "colleagues." In this paper, the characteristics of guerilla warriors will be described and their tactics explained, followed by a discussion of how these tactics can be successfully adopted by faculty development specialists intending to effect change among faculty members teaching in the higher education environment.

Definitions

Guerillas will be defined, for the purposes of this paper, as individuals working to bring about change who are not part of "regular" formations of soldiers or combatants. They are typically part of one or more small bands of highly mobile factions who find themselves in a position of weakness against a stronger (and often enormously powerful) system, organization, or psychological perspective.

As a set of warfare tactics, guerilla activities have been compared to a "spreading puddle" in contrast to traditional, top-down military strategies that resemble "water running in a straight line downhill." (Yn, 1998) (It may be useful, at this point, to recall and contemplate historical examples of top-down attempts to promote innovation in educational institutions, from K-12 through postsecondary.) Although some of the tactics adopted by guerillas -- the use or implicit threat of violence, for example -- are not recommended for use in faculty development, many others are well-suited to promoting the use of innovative instructional strategies and technology applications for teaching. How can faculty development professionals determine if they're in position to adopt such strategies?

Guerilla Characteristics

Determining if one is appropriately situated to use these tactics (or has "the right stuff") only requires understanding the nature of the guerilla and ascertaining one's resemblance to these warriors. The primary characteristic is that the individual is *committed to bringing about change* for the betterment of the organization. Modern guerillas are almost always revolutionaries who want to change the current system, as opposed to reactionaries who would choose to protect the status quo. (Hughes, 1962) The current system of utilizing technology for teaching in higher education (ripe for guerilla activism) is often fragmented in its support base, concerned more with hardware than with learning, and lacking in appropriate incentives. Promoting new ways of thinking about technology and new behaviors for learning improvement are the mark of today's faculty development guerilla.

Another characteristic trait is an *aversion to the pitched battle.* (U.S. Army, 1962) This may manifest itself, for faculty development specialists, in what could be considered stealth activities – those events that have goals beyond the obvious or published. In addition, this variable will exclude those individuals who prefer to engage in confrontational interactions or whose interpersonal manner would be described as aggressive or combative. These characteristics will often result in an "us versus them" mentality, the opposite of the desired effect of creating alliances. The guerilla certainly is able to engage in direct conflict, but does not seek it out and instead chooses to align him or herself with the group by being helpful, friendly, and sympathetic to the concerns of others.

Agility in a rapidly changing environment is a hallmark of the guerilla and has an honorable place in the history of American liberty. Francis Marion, the "Swamp Fox," is credited with leading his guerilla band with a mobility that out-maneuvered the British forces and resulted in the regaining of the Carolinas during the Revolution War. (Joes, 1996) As a faculty development specialist, agility would more likely be shown in the swift evaluation of potentially beneficial practices for teaching and learning, requiring a continual review of research in cognitive processing, technological advances, and learning strategies. The expeditious promotion of recently validated practices reveals the guerilla as a credible source and a reliable advisor to faculty.

Because guerillas work in environments shaped and controlled by the opposing forces, a clear understanding of this milieu is imperative. (Guevara, 1961) Being *well-informed in the local context* can mean the difference between being perceived as one of the group or as a fringe lunatic, tilting at windmills to no apparent benefit. In faculty development circles, this means understanding the obstacles in the path of instructors who attempt to integrate technology applications into their instruction, knowledge of the incentives (or lack thereof) for innovation, and awareness of the multiple (and sometimes contradictory) priorities imposed on the faculty member who chooses to adopt new teaching strategies. Teaching experience, while not mandatory, can be extremely beneficial to the faculty development professional who hopes to appreciate what instructors are facing.

The guerilla band may work independently, but knowing how to *utilize the help of external "sponsors"* can be of significant benefit. In warfare, guerillas often have the aid of other countries with sympathetic political philosophies upon which to draw. The savvy faculty development group will sometimes rely on private consultants, hardware or software vendors, or colleagues at other institutions who have faced similar challenges. Going it alone is no longer a viable option (if it ever was); implementing wide-spread change – especially when it involves technology -- can be extremely expensive and time-consuming and should not be attempted without the support of others who can lend assistance when necessary.

Finally, in case it isn't obvious, the guerilla needs to maintain *high morale* for him/herself and associates in order to work against what can seem like overwhelming odds. Faced with promoting change in higher education, an environment not known for its flexibility, the faculty development specialist must avoid fatalism, cynicism, and stagnation, while maintaining a healthy balance of realism and hope. Joes (1996) attributes the positive morale of guerilla warriors to "belief that the cause is both just and destined to triumph." (p. 6) So must faculty development guerillas hold firmly to the raison d'etre of their enterprise.

The preceding discussion of guerilla characteristics (committed to bringing about change, aversion to the pitched battle, agility in a rapidly-changing environment, well-informed about the local context, awareness of external sponsors, and high morale) provides a general profile of the individual who could be classified as a guerilla. However, it is important to note that these traits were not articulated to promote or reinforce arbitrary categorization of faculty development professionals, but rather to suggest that individuals recognizing themselves in this description may, as a consequence, choose to employ guerilla tactics to enhance their professional effectiveness.

Tactics

There are no guerillas without action, and tactics are what truly defines guerilla undertakings. The five specific tactics that will be discussed include moving among the people, use of persuasive techniques, constant activity, judicial use of retreat, and working with "regular" forces. As a side note, the use of terrorism or personal assaults – although adopted by some modern guerilla forces – were never promoted as the most useful or effective activities by Mao, Guevara, or other well-known guerilla chieftains. Moreover, their use in faculty development settings is of limited benefit and not encouraged by this author.

Moving among the people, as a tactic, has its roots in Mao's teachings. He considered the guerilla a fish and the people "as the water in which he swims." (Hughes, 1962) This enables the guerilla to recruit followers from among the local population, and to identify the opinion leaders within the social structure. These strategies are essential to building a base of local support for later activities and for gleaning helpful information on potential obstacles.

For faculty development guerillas, moving among the people requires discarding any viewpoint that fosters an "us versus them" classification of the [good] innovators and [bad] faculty who need to be overhauled, transformed, or somehow repaired. This unfortunate taking of sides will occasionally result from top-down sorts of tactics that impose clear-cut dichotomies of those who fall into line and those who resist. Tactically, moving among the people is a way to recognize and value resistance as a signal that additional education is required or that there is a need to work more closely with opinion leaders. The image presented earlier of guerillas working like a spreading puddle, rather than a stream running downhill, is appropriate here. The idea is not to sweep faculty up in the onrushing deluge but to introduce change in a deliberate and continuous evolution of applications that is compatible with their existing values and practices.

This philosophy runs counter to the popular argument that only by abandoning our current practices, reorganizing the traditional structure of higher education, and wholly adopting new paradigms of teaching and learning will true innovation occur. This may be true; however, such an event does not appear to be on the horizon and promoting "small ideas" that work within the existing structure while concurrently introducing revolutionary germs into the system is likely the best interim strategy.

The effective guerilla *uses persuasive techniques* to create a favorable opinion of the cause, win over the local population, and ensure longevity for the effort. (Guevara, 1961; U.S. Army, 1962) Without a favorable opinion of the cause, locals will relegate the guerillas to the status of rogue gangs who are not acting for the benefit of the general population, thus making it unlikely that support or information will be forthcoming. Winning over the locals requires that the guerillas build credibility and inspire confidence. Ensuring longevity means persuading members of an intact social system to support or join forces with a group whose goal is to challenge the status quo -- a system that, for some, may have direct or indirect benefits. For others, the existing structure may not be optimal, but it is familiar, and venturing into the unknown is not something to which humans are predisposed.

The guerilla's true goal is to target the minds of the people, but for the faculty development specialist, this can be a formidable challenge. Expecting individuals who are the successful products of the existing educational system (i.e., faculty members) to embrace teaching strategies that may appear to run counter to this tradition can be a frustrating experience. Techniques for winning over such a group include building professional credibility and emphasizing the similarities in values held by the guerilla and the local population. For example, when promoting innovative practices, research findings supporting such instructional strategies should be discussed, along with examples from other institutions where such strategies have been successfully implemented, followed by a discussion of how these strategies complement the jointly-held values of the group.

If new ideas about how technology can improve teaching and learning are to be adopted, and ultimately manifested in the classroom, the identification and persuasion of opinion leaders is also critical, for these are the individuals who have the greatest influence within the group. Building a cadre of respected faculty members who support the guerilla's activities is an invaluable part of the diffusion process and will exponentially extend the initial efforts at persuading others to join the movement.

The guerilla does not rely on winning a few major battles, but is in a state of *constant action*, wearing down the opposition through persistent effort, meaning that no single, isolated act determines the outcome of the overall movement. Francis Marion's group cut off supply lines to the British troops, provoked them night and day, and disrupted their communications, among other things, in order to physically and psychologically fatigue the enemy. (Joes, 1996) Thus, no single event (a major battle, for example), but rather many small skirmishes led to a successful result.

The guerilla hoping to introduce faculty to instructional technology applications would be wise to adopt this attitude of persistence, albeit with a focus on constructive deeds. By saturating the faculty with constructive ideas for technology integration, numerous opportunities for training, and useful information on the advantages of such applications, the faculty development professional prepares the ground for adoption. These minor, but frequent, reminders will gradually create a sense of the unremarkable about various technologies – a necessary step toward their diffusion throughout the organization. No single workshop, seminar, brochure, presentation, discussion forum, demonstration, Website, or consultation will win the minds of the faculty, but the continual dripping of good ideas onto the rocks of tradition will eventually wear away the resistance.

By definition, guerillas are fighters who are in a position of weakness against a more powerful enemy. Realistically, this means that *knowing when to retreat* has strategic value – Guevara put it succinctly when he said, "The essential task of the guerilla fighter is to keep himself from being destroyed." (Guevara, 1961, p. 21) Complementing this is the idea that a skirmish that cannot be won should not be undertaken by the guerilla – why waste the few resources available on a futile effort?

This tactic has great value in faculty development. One should never plan to achieve complete adoption and diffusion of an innovation throughout a group – it is unrealistic and almost always unachievable. One way to look at this is with a triage philosophy, determining how best to use the finite resources of time, people, equipment, and facilities; i.e., should all of the available bandages be used on patients who are sure to die, or should they be distributed among those who may be saved by the attempt? If there are individuals who are staunchly determined to avoid change, one may be tempted to continue trying to win them over, meanwhile using up time or other resources that could be put to more effective use elsewhere. The key is to distinguish between the truly resistant and those who would eventually come around given time and motivation, and for this, unfortunately, there are no easy guidelines.

Knowing when to retreat also requires the ability to evaluate past efforts to determine how best to proceed in an ambiguous environment. If earlier attempts to engage faculty in technology integration activities were unsuccessful, there is something to be gained from analyzing why and determining how things may have been done differently. Retreat doesn't necessarily indicate surrender – it can instead provide a space for reviewing strategy and reforming later events.

Guerilla activists sometimes work independently of any organized military forces, although they are more effective if *their efforts are combined with traditionally trained and deployed units.* Each form of warfare has strengths complementary to the other's weaknesses, allowing greater flexibility for the regular troops and added support for the irregulars. This alliance with conventional military ranks also lends an air of credibility to the guerillas, providing validation from a larger (and probably more organized) system.

One only has to review the history of education in the United States to realize that efforts at instructional innovation are most effective when a combination of top-down and bottom-up strategies is used. Wiring campuses (k-12 through postsecondary) is an excellent example of this. Grass-roots campaigns involving teachers, students, and parents have worked to promote the use of the Internet in schools, while administrators have operated from a big-picture perspective to ensure that funding and infrastructure concerns were addressed for long-term viability. Such a project could not be accomplished successfully with only one part of the equation – without high level support to fund the capital improvements required for networking, nothing would happen; without the grass-roots support to focus on the most effective uses of a network, the hardware quickly becomes irrelevant. Technology integration has become too expensive for anything resembling autonomy to drive it – guerillas will, in many cases, need the support and resources that an administrative entity can provide before they'll make a noticeable difference in the status quo. Creating alliances with the administrative faction (while maintaining loyalties to the people) is also a path to greater credibility, as well as a sometimes-grudging respect, for guerilla forces.

Summary

It should come as no surprise that there are similar ideas and tactics linking guerilla warriors and those who work for change in large organizations. Their motives, in a broad sense, are often similar and they share many personal traits, as well. Learning how to facilitate change and promote innovation (particularly under difficult circumstances or in a hostile environment), therefore, may mean adopting guerilla tactics. These methods can facilitate the diffusion of innovations throughout a system in a manner not unlike that described by Rogers (1995), including the identification of opinion leaders, careful use of existing communication channels, and emphasis on the relative advantage of adopting the innovation.

Although this perspective utilizes a warfare metaphor, it is important to remember that these tactics don't presume (or encourage) an "us versus them" dichotomy of change agents and faculty. The "enemy" in this situation, would instead be the collected obstacles that deter faculty from adopting technology applications to improve the teaching/learning processes in their courses – lack of training or tech support, outmoded classroom facilities, nonexistent incentives, or opposition from administrators are just a few examples of typical deterrents to innovation. Faculty development guerillas work with faculty, not against them, to surmount these hurdles.

Finally, the techniques described could be applied to any form of innovation or change – the process leading to improvement, whether radical or modest, remains a constant. Guerilla activism is open to those committed to the cause.

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241

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0046

Title: What It Takes: New Roles, Competencies and Models for Implementing Online Distance Education

Author: Lawrence C. Ragan and Peter Williams

Organization: The Pennsylvania State University and Rogers State University

Year: 2000

Abstract: Online courses offer unprecedented access and learning opportunities for students and faculty alike. In contrast to resident education, the successful implementation of an online course requires a larger team effort. This session will address the changing roles and responsibilities of these teams as well as present new support models for distance education.

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January 9, 2000
NUTN

Designing Effective On-line Courses
December 5, 2000
College Board Conference
Boston Massachusetts

What It Takes: New Roles Competencies and Models for Implementing Online Distance Education
October 11, 2000
Authors: Lawrence C. Ragan, PhD, Director of Instructional Design and Development, Penn State's World Campus, Pennsylvania, and
Peter Williams, PhD, Director of Distance Education,Rogers State University, Oklahoma
EDUCAUSE 2000: Nashville TN

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0052

Title: Who Is the Online Student?

Author: Joel L. Hartman and Barbara Truman-Davis

Organization: University of Central Florida

Year: 2000

Abstract: Thousands of students enroll in online courses every year. Who are these students? What factors contribute to their academic success and persistence? What are the relationships between students' learning styles and success in the online environment? Results from a multiyear study of students taking online courses at the University of Central Florida provide answers to these questions and others to be posed and discussed in this timely session.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0039

Title: Distributed Learning [2000]

Author: Brian Hawkins and Diana Oblinger

Organization: EDUCAUSE and University of North Carolina Office of the President

Year: 2000

Abstract: This presentation focuses on a Web-based conceptual framework for use as a tool to engage decision makers in active learning about the concepts as they determine how appropriately to position their institutions with regard to distributed learning. This "tool" attempts to allow the systematic examination of preparedness, markets, and other associated variables.

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Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0020
Title:	ERP at The University of Nebraska: Defining Roles
Author:	Don Mihulka, Dave Reifschneider, and Jim Buckler
Organization:	University of Nebraska and Prescient Consulting
Year:	2000
Abstract:	Based on lessons learned during the University of Nebraska's SAP R/3 implementation, this PowerPoint presentation focuses on project management's role in project team staffing for an ERP implementation that utilizes functional and IT resources. Presenters review roles and responsibilities, look at successes, and explore areas that were not completely successful.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0082
Title:	If the Shoe Fits: Integrating New Electronic Resources into the Academy and the Library
Author:	Sharon A. Hogan, Julie Hurd, and Nancy R. John
Organization:	University of Illinois at Chicago
Year:	2000
Abstract:	Much of the information used by universities is digital. But university faculties and libraries have longstanding processes and procedures that do not respond well to the enormous challenge these digital objects bring with them. Using case studies based on their experiences during the past two years, panel members will talk about the most critical barriers, issues, and opportunities concerning acquiring and systematically integrating more than 3,000 digital resources for and with a user community.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0034

Title: IT Recruiting - Great Candidates Can Be Found!

Author: Judy Caruso and Jennifer Gebert

Organization: University of Wisconsin-Madison and State of Wisconsin Department of Employment Relations

Year: 2000

Abstract:

Over the past four years, the Chief Information Officers of Wisconsin State Government and the University of Wisconsin have partnered with the State Department of Employment Relations on a number of initiatives aimed at improving the recruitment and retention of information technology staff. Two years ago, the CIOs pooled their funds and hired an IT Recruiter to lead their recruitment efforts. This paper will discuss these recruitment efforts and provide insight into how you can improve your IT staff recruitment.

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IT Recruiting – Great Candidates Can Be Found!

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Abstract: Over the past four years, the Chief Information Officers of Wisconsin State Government and the University of Wisconsin have partnered with the State Department of Employment Relations on a number of initiatives aimed at improving the recruitment and retention of information technology staff. Two years ago, the CIOs pooled their funds and hired an IT Recruiter to lead their recruitment efforts. This paper will discuss these recruitment efforts and provide insight into how you can improve your IT staff recruitment.

State-University IT Staffing Initiatives

In 1996, the Wisconsin Department of Employment Relations began working with the Chief Information Officers of Wisconsin State Government and the University of Wisconsin to resolve a staffing crisis in information technology. At that time, hiring and retaining IT staff was very difficult due to low salaries, long recruitment cycles, and inflexible state rules regarding classification, recruitment processes, and compensation. An advisory board consisting of these CIOs and Human Resource professionals was formed. This board's major objective was to advise DER on issues related to IT staff recruitment and retention.

Since then, the processes and rules associated with IT staff recruitment and retention have significantly changed and improved. This includes reworking the classification system so that titles can be more easily matched to formal market surveys and heightening the awareness of the Governor and university chancellors regarding the IT staffing crisis. Legislative changes have included: broadbanding of IT classes, across-the-board salary increases, and streamlined recruitment procedures. In addition, IT organizations and Human Resource departments at the various agencies and universities have banded together to streamline their recruitment processes.

Hiring an IT Recruiter

The CIOs and Human Resource professionals realized that the processes of advertising for jobs and recruiting to fill those jobs needed improvement. The Human Resource staff in the agencies and universities performed those duties, but they were so busy that their efforts did not receive much attention. The IT managers themselves did not have the required expertise. As a result, the state IT recruiting efforts resulted in "boring" advertisements placed only in newspapers. The IT departments found that they were merely "trading" staff among departments and bringing few new staff to the labor market. In December 1998, as a result of these concerns, DER hired an IT Recruiter using monies contributed by some of the CIOs.

Jennifer Gebert, the State IT Recruiter, has been instrumental in improving IT staff recruiting efforts. Because she is dedicated full-time to recruitment efforts, she is constantly seeking creative methods to promote state jobs. She monitors the success of various initiatives and provides a solid link between the IT managers and Human Resource professionals.

Changing Recruiting Strategies

Staff recruiting involves two major strategies: attracting applicants and recruiting those applicants. Attracting good applicants requires careful examination of the labor market's expectations – the salaries and benefits that are expected for various kinds of work. In trying to attract applicants, recruiters must consider what applicants expect from employers – the recruiting techniques and non-monetary items that they expect.

The recruitment strategies of the past do not address today's IT staffing challenges. Demand for skilled IT staff exceeds supply. The talent pool is shrinking. There is greater competition for skilled staff, and private sector companies are creating new incentive programs to hire these staff. In addition, today's applicants have different expectations than applicants of just a few years ago. Recruiting IT applicants today no longer involves the prospective employer saying, "Sell me on why I should HIRE you for this job…"; rather the applicant says, "Sell me on why I should TAKE this job."

Attracting Applicants – Labor Market Expectations

When recruiting a promising applicant, a public-sector IT organization must address these issues:

1. Timing – React quickly and yet sensitively to the applicant's needs.
2. Demonstrate flexibility in interviewing – consider telephone and video conferencing.
3. Follow a consistent process – be able to explain it to the applicant so that he or she knows what to expect and when.
4. Interview – handle it professionally; offer parking and travel expense coverage.
5. Follow up – Quickly respond with a thank you and further information.

Other steps can make your offer more appealing to a job candidate. Close the deal with the applicant as quickly and effectively as possible. Make the offer as soon as possible after the interview, because a delay in the offer process is often the difference between getting the applicant you want and settling for second best. Personalize the offer letter so it does not appear to be a mere form letter. Include resolution of negotiating points.

Traditional Recruiting versus Reverse Recruiting

Traditional recruiting starts with a job description followed by attention to location, salary, and benefits. When those recruitment items have been met, concerns about leading-edge technology, training and mentoring opportunities, work culture and people, and industry career growth come into play.

Reverse recruiting starts with industry career growth, then work culture and people, and so forth, ending with the job description. Many of today's applicants are more interested in what the job has to offer for their own career development than in what the job description says or what the job pays. Employers must recognize this as they try to use traditional recruiting methods with applicants who may have a different set of needs.

Where to Find New Talent and Minorities

Tough times for recruiting require creative recruiting strategies. While traditional job advertising methods such as advertisements in newspapers and trade journals continue to have value, job postings in less-traditional places can be very effective. Use of alumni association lists, trade journals, billboards, Web ads, radio, and television all expand the number of prospective applicants who see and hear of jobs. Presence at job fairs also increases the likelihood of finding good applicants. Often former and current staff can serve as sources of information about potential recruits.

A good source of new IT talent is your own university. Offering training in IT skills can be a very effective approach to providing a new career to existing university staff. Student employees and internships also offer a way of bringing in new staff. These programs may be resource intensive and labor intensive in the short run, but often are very cost effective over the long term. IT organizations can also proactively seek to hire their own graduates. Offering student jobs and entry-to-intermediate-level jobs to students at local universities can help them develop their careers as well as providing needed workers for IT organizations in those institutions.

Finding minority applicants can be difficult. Trainee programs and student school-to-work programs can offer opportunities for IT careers to the participants. They can also offer opportunities for IT organizations to diversify their workforces. The University of Wisconsin-Madison establishes relationships with area high school students by providing training and outreach programs throughout their high school career.

The Interview Process

The interview is an opportunity for the prospective employer to make the candidate feel not only needed but desired. Applicants like a friendly first impression. They like personal recommendations and professional offer letters. They appreciate finding company information on the Internet, so they can be informed before they arrive at the interview. Applicants also appreciate "little things," such as being offered a cup of coffee, obtaining information on the local community, and receiving ready access to parking. Applicants like to be accommodated. To reach distance candidates, use video-conferencing and telephone interviewing.

Applicants do not like lengthy delays, broken promises, lack of confidentiality, conflicting information, and a lengthy interview or application process. They expect to see a job description and an interviewer who is prepared. They want the employing unit's staff to appear professional and the process to be clear and organized.

Why Applicants Accept Jobs

Applicants accept job offers for a variety of reasons, only one of which is salary. Colleges and universities are fortunate to have the reputation of being good places to work; they should use that reputation to their advantage in recruiting IT staff.

Colleges and universities tend to be on the leading edge of technology, which attracts applicants. They often offer very competitive benefits packages and are viewed as places with good management in a relaxed setting. While most colleges and universities do not offer market-rate salaries, the extras they offer can offset the salary gap. In their recruiting efforts, college and university IT organizations need to emphasize their strengths in attracting the best applicants.

Why Applicants Reject Job Offers

Applicants often reject job offers in response to what they see as poor salary and benefit offerings. But often, they also reject job offers based on gut feelings and intangibles. Before making an offer, prospective employers need to be aware of an applicant's job priorities. If there is a fairly good match between what is being offered and what the applicant wants or needs from a job, the chance of being able to hire the applicant is good. Sometimes, forces beyond an employer's control, such as multiple offers and counter offers, come into play. Clearly, an IT organization must improve its ability to make counter offers if required.

Recruitment Changes at the University of Wisconsin and Wisconsin State Government

Over the past few years, the University of Wisconsin System and the State of Wisconsin Government CIOs and Human Resource professionals have changed the state recruitment process in a number of ways. These changes have greatly improved the quality of the organizations' applicant pools and have resulted in better hires.

1. The Wisconsin State Civil Service System has a long history of requiring applicants to take an exam to qualify for a state job. For IT jobs, the process was streamlined while still adhering to important merit-system principles. Instead of written exams, pass/fail evaluations and resume screening tools were used. The application period was shortened, and a process was initiated for prompt follow-up with candidates.

2. The Web is now used to assist in recruitment efforts. Web-based job advertising is found at www.itcareers.state.wi.us. The State and University recently joined an Internet recruiting agency, techies.com. Web resume searches are possible for hard-to-fill positions. For jobs at the entry-intermediate level, prospective applicants apply online at http://jobs.state.wi.us/elisp. The Department of Employment Relations also provides the hiring managers with online candidate referrals.

3. The Wisconsin State Civil Service System operates under state statutes and administrative rules regarding how many candidates the hiring manager can interview. Recent changes to the civil service statutes allow the elimination of the "rule of 5" and allow the hiring manager to interview all candidates who pass the qualification screening. Hiring managers can now interview all qualified candidates or decide how many to interview.

4. Job fairs have provided opportunities for hiring managers to contact candidates quickly and effectively. Candidates are required to complete an "exam" in the form of an objective inventory questionnaire (OIQ) that can be completed in a matter of minutes. It may be as simple as five "yes" or "no" questions about the applicant's technical background. If the applicant passes, he or she takes part in interviews with the hiring manager onsite at the career fair. Hiring managers can issue immediate job offers. Whether or not the applicant is hired, he or she receives feedback immediately or within a few days.

   Onsite interviewing and immediate job offers have enabled the University to hire far more quickly than in the past. What once involved several separate and time-consuming steps (asking candidates to submit applications, then evaluating applications, and then scheduling interviews) is now done at one time, literally in minutes. In one example, an applicant received an immediate job offer, and the new IT staff member reported to work 16 days after he was interviewed onsite.

5. With legislative and bargaining changes made in the past few years, the University of Wisconsin and State of Wisconsin IT directors now have flexibility regarding compensation. State IT jobs are broadbanded with expanded pay ranges and pay-upon-appointment flexibility. The hiring manager can offer a starting salary commensurate with the skills of the applicant. The IT managers also have flexibility to provide additional compensation awards for existing employees.

6. Colleges and universities are typically viewed as good places to work. To build on that perception, the University of Wisconsin has initiated some practices that further its positive work environment. The University offers flexible work schedules with some telecommuting options. It provides challenging work and shared decision-making, where possible.

Recommendations to Improve Recruiting

In summary, a number of key initiatives can help recruiting. These include:

- Improve job advertising using the Web, radio, billboards, and job fairs
- Emphasize the non-salary benefits of working at a college/university
- Be prepared with counteroffers
- Create flexible working hours with telecommuting options
- Streamline the recruiting process, eliminating unnecessary steps
- Use the Web to recruit
- Use video conferencing and telephone interviews for recruiting

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0022

Title: MIS Finance And Budgeting Issues In Small Public And Private Institutions

Author: Maggie McClintock

Organization: Mississippi University for Women

Year: 2000

Abstract: Studies on Information System resources in higher education have traditionally focused on the large research institutions leaving much unsaid about other types of institutions. The educational institutions focused on in this study are smaller colleges and universities -- institutions with fewer than 5000 students. Some of the major areas studied were the finance and budgeting of technology resources. The author surveyed 629 CAUSE and Educom institutions with fewer than 5000 students in 1996. Of the 629 institutions survey, 350 provided usable responses for this study. The study was differentiated by public and private institutions.

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MIS FINANCE AND BUDGETING ISSUES
IN
SMALL PUBLIC AND PRIVATE INSTITUTIONS

Dr. Maggie McClintock
Mississippi University for Women
Columbus
Mississippi

Studies on Information System resources in higher education have traditionally focused on the large research institutions leaving much unsaid about other types of institutions. The educational institutions focused on in this study are smaller colleges and universities - institutions with fewer than 5000 students. Some of the major areas studied were the finance and budgeting of technology resources. The author surveyed 629 CAUSE and Educom institutions with fewer than 5000 students in 1996. Of the 629 institutions survey, 350 provided usable responses for this study. The study was differentiated by public and private institutions.

Introduction

The ubiquitous of computers is an undisputable fact of life as we enter the 21st Century. The wide-spread use of computer resources in government and industry paralleled the development of technology. While computers also existed in the academic arena early on, it is only in more recent years that colleges and universities have come to recognize the importance of providing computing resources to all their constituent groups: students, faculty, and staff. Many of academia's well-known authors have written about the critical nature of information technology to education; for example, Keller (1993) wrote "that institutions that have powerful information technology and capabilities are likely to widen their competitive advantage over the 'have-nots'" (p. 12). Stuckey (1996) and McClure (1996) stated that information resources were not an option, but a necessity in higher education and institutions that did not embrace information technology could find themselves extinct. Alvarez (1996) emphasized that even if institutions maintained the status quo in technology they would be at risk and West (1996) said that institutions that failed to take advantage of technology would find themselves left behind in our market economy.

Even though authors acknowledge the importance of technology to higher education, the question remains as to whether higher education's decision-makers recognize the implications of this new era so aptly called the "Information Age." One of the major problems identified in all types of institutions seems to be a lack of information concerning the annual expenditures for information technology according to Green and Jenkins (1998). This situation is further exacerbated if the institution is small because though the literature abounds with articles concerning the importance of technology to higher education, few references exist that pertain to small colleges and universities and their technology needs. Even fewer references examine the budgeting issues related to technological resources in the smaller institutions.

Literature Review of Finance/Budgeting for Technology

The finance/budgeting issue is the most critical issue facing information system administrators in small colleges and universities. Technology is costly and the long-range benefits that could accrue to administrative services and to the institutions as a whole often remain hidden. Marshall (1991) wrote that information systems would be fully integrated into higher education only "when the costs of computing are incorporated into planning and budgets" (p. 3). He stressed that planning and budgeting for technology were essential. Ernst and Segall (1995) noted that "the problem is that for many institutions, the investments made in new systems are not always integrated with institution-wide strategic directions and needs" (p. 12). McCollum reporting in The Chronicle quoted Jasper as saying that "technology is really not the story. The story is money" (p. A63).

The importance of budgeting as part of the strategic planning process was emphasized by Oberlin (1994) who wrote that "…budgets are the link between plans and actions. They translate strategic plans into the financial resources necessary to implement the plan" (p. 24). One element that is frequently overlooked which has major implications in the finance and budgeting of technology is the proliferation of personal computers in organizations. Unfortunately, the financial accounting community, including accountants within the university environment, seem unable to develop policies for PC investments that often become obsolete in 12 to 18 months but are still functional according to Olivia, Khosrowpour, and Amoroso (1991).

In the rush to client/server networks, many organizations, including educational institutions, were caught unaware of the total cost of ownership of this new computing environment. Kirwin and Younker (1995) reported that the five year total cost of ownership (TCO) for a PC went from $19,296 in 1987 to $41,436 in 1994, an increase of 153%. More recently, Simpson (1997) reported that the Gartner Group averaged the TCO for a Win95 PC in 1997 at $9800 a year or $49,000 across five years. Over 80% of the TCO is associated with end-user operations and support functions; Gartner Group identified end-user operations as the time spent by end-users on non-job related PC activities.

Another chief difficulty associated with the financial costs of technology relates to the fact that end-user computing is so transparent within the organization to seem as if it doesn't really exist. On the other hand, it is ubiquitous, pervasive and wholly necessary in today's computing environment. While computing costs associated with user departmental budgets are difficult to locate or isolate, the budgets of information system departments are centralized and therefore highly visible in an organization. This factor is stressed by Solomon (1994) who noted that costs associated with departmental software are often unknown and that most organizations "...cannot tell you how many of which software packages are installed...what is worse, most of those costs are hidden and not fully understood by management because they creep in so gradually..." (p. 48).

Another startling fact is that while the cost of the centralized information system department budgets has decreased in educational institutions, spending on technology has risen. Decision makers have failed to realize that this situation has occurred because 60% of the information technology expenses are actually outside of the central computer center budget. The true cost of technology goes unrecognized since costs associated with end-user computing fail to appear in either a computer center or a user departmental budget. These costs are well hidden precisely because they are associated with the end-user and such costs are not recognized as information technology expenses. Consequently while the information system department budgets are shrinking the actual cost of technology in the enterprise is increasing, according to Kirwin and Younker (1995).

Apparently most post secondary institutions have failed to create any type of amortization plan for the acquisition or retirement of obsolete equipment, particularly as it relates to PCs. A number of references in the literature refer to the cost of technology as the major "black hole" of the institutional budget (Green & Gilbert, 1995; Oberlin, 1994; Ringle & Smallen, 1995). This budgetary concern was also echoed by Barone (1996) who wrote:

> Technology costs money, lots of money. The up front cost of purchase is just the tip of the iceberg....Expensive or not, value-added or not, technology is an indispensable element of teaching, research and administration on our campuses today. To pay for it, planners and managers, at all levels, must engage in the unpalatable exercise of budget reallocation. (p. 28)

Green and Jasper reported that the 1997 Campus Computing Survey revealed that less than one third of the reporting institutions had a financial plan for technology and that over half of the institutions funded their technology resources with one-time budget allocations. The financial situation and budgetary constraints are even more critical to the small colleges and universities which comprise at least two-thirds of all higher educational institutions. Ringle and Smallen (1995) highlighted this situation at the 1995 CAUSE conference when they stated that "one of the more important distinguishing characteristics of small colleges is the scarcity of resources they can apply to the pursuit of technology goals" (p. 1-1-2).

Another problem associated with the financing of technology in small versus large institutions was also noted by Ringle and Smallen (1995) who wrote that:

> …universities have a long history of using technology fees and charge-back mechanisms to fund computing services, and restricting computing access to students in particular courses. These practices are foreign to small institutions which generally finance educational programs through tuition charges and institutional funds. (p. 1-1-3)

Statement of the Problem

In 1996, the author conducted a study of the 629 CAUSE and Educom member institutions with 5000 or fewer students. The budgeting and financing of information system resources was a major focus of the author's study. The 1996 study posed the question "To what extent did private institutions with 5000 or fewer students differ from public institutions of 5000 or fewer students with regard to information system department budgets and institutional budgetary allocations?" Testing took place on the following seven hypotheses:

H_{01}: There are no significant relationships between information system budgets in private institutions and the inflation rate as compared with the same relationship in public institutions.

H_{02}: There are no significant relationships in the total expenditures for information system resources and expenditures for other institutional resources in private institutions as compared with the same types of expenditures in public institutions.

H_{03}: There are no significant relationships in a private institution's giving a high priority to increasing information system department budgets as compared with giving similar priority in public institutions.

H_{04}: There are no significant relationships in the charging of computer lab fees in private institutions as compared with the charging of similar lab fees in public institutions.

H_{05}: There are no significant relationships in budgetary distribution of computer lab fees in private institutions as compared with similar lab fee distribution in public institutions.

H_{06}: There are no significant relationships in the charging of technology fees in private institutions as compared with the charging of similar technology fees in public institutions

H_{07}: There are no significant relationships in the budgetary distribution of technology fees in private institutions as compared with similar technology fee distribution in public institutions.

Methodology

The author's study included the total population of 629 institutions that were members of CAUSE and Educom during 1996. The first two contacts were made by a mail survey to the information system director at each school. Directors that did not reply to the mail surveys were then contacted by email or telephone if no email address was available. A total of 350 surveys were returned and usable for a return rate of 55.6%. The data were analyzed using the SPSS statistical software for Windows version 6.1. Chi-square contingency tables were used to test the significance of the comparative data and Pearson correlations were reported. The .05 alpha level was used as the level of significance for testing the hypotheses. Frequencies were taken on institutional data and correlations were used to determine relationships between variables.

Demographics

Of the 350 responding institutions, 63.7% were private and 36.3% were public, corresponding to the national profile. Of the 629 CAUSE and Educom institutions that were mailed surveys, 62% were private and 38% public. The Chronicle of Higher Education (2000) reported that for academic year 1997/98, 67% of the U.S. institutions of higher education were private and 33% were public for schools with fewer than 5000 students.

A total of 23% of the institutions belonged to either CAUSE or Educom. The lowest total institutional budget was $2.5 million and the highest reported was $163 million. The lowest reported information technology budget was $50,000 and the highest reported was $4.5 million in the author's study. The mean information technology budget was $911,194 for the reporting institutions. The mean institutional budget was $29.7 million. Seven institutions of the 350 respondents did not furnish budget data. Unfortunately no budget data were available for a national comparison.

Frequencies and Correlations

This section covers a summary of findings drawn through simple comparisons of frequencies or percentages and correlations between variables. The respondents in this study closely parallel similar percentages for public and private institutions found in the population of the 629 institutions used in this study, as well as the percentages in the total population of institutions with less than 5000 students. Since the percentages are representative of the wider population based on institutional type, a case can be made that generalizations to these populations are possible for any relationships found between private and public institutions.

Positive relationships were found between several of the variables when the Pearson correlation method was used. When the FTE variable was tested against individual budgetary factors, it was found that if FTE increased so would the total institutional budget as well as the information technology budget. When correlating the two budgets, a positive relationship was found, therefore, the findings suggest that as institutional budgets increase so do information technology budgets.

Research Issue

The research issue concerned the relationship between finance/budgeting allocations and information technology departments in private and public institutions with 5000 students or less to determine if any differentiation existed between the two types of institutions. Seven hypotheses related to this issue. Chi-square analysis revealed that three of the seven null hypotheses were rejected.

Hypothesis four was found to be significant under chi-square analysis suggesting a relationship existed in the charging of computer lab fees when comparing private and public institutions. Though the finding suggested that few private or public institutions charge computer lab fees, the private institutions are much less likely to charge computer lab fees than their public counterparts. Only 22.5% of the respondents in private institutions indicated that they charged a computer lab fee while 37.8% of the public institutions responded that they did so.

Hypothesis six was found to be significant using chi-square analysis suggesting a relationship in the charging of a technology fee when comparing the private and the public institutions. Though the finding suggested that few private or public institutions charge technology fees, the private institutions are less likely to charge such fees than their public counterparts. Only 14.4% of the respondents in private institutions indicated that they charged a technology fee while 26.8% of the public institutions did so.

Hypothesis seven was also found to be significant suggesting a relationship in the distribution of technology fees when comparing the private and public institutions that charged such fees. The findings suggested that private institutions that have a technology fee were more likely to distribute that fee to their General Fund before allocating it elsewhere. Private institutions with such a fee indicated that 62.5% of the time it was allocated to the General Fund and 25% of the time it was allocated to an information technology department. Public institutions with the technology fee were more likely to allocate the money to other areas 41.2% of the time and to their information technology departments 38.2% of the time. In both the private and public institutions, this implies that the technology departments are unlikely to benefit substantially from the technology fee.

Summary of the Findings Based on the Literature

In regard to the issues of finance/budgeting, Ringle and Smallen (1995) indicated that small colleges and universities do not use technology fees or charge-back mechanisms. The author's findings confirm that technology fees are rarely used in the small institutions, though small public institutions do so more frequently than the small private institutions which bears out statements by Green and Jenkins (1998) that public colleges and universities are turning to students fees to finance technology costs.

It remains to be seen, however, whether the institutions that responded to this study are devoting substantial financial resources to technology as so many authors insist should be done (e.g., Barone, 1996; Gilbert, 1994; Oberlin, 1996). This study suggests that information technology administrators perceive that the IT departments are losing ground financially. Heterick (1994) recently wrote that 5% of the total institutional budget was an adequate level of budgeting for technology. A CAUSE profile study by Munson, Richter, and Zastrocky (1994) found a four percent average IT budget, while the author's study revealed only a mean IT budget of three percent.

Conclusions

1. The findings in the author's study indicated that chief information system administrators perceived that information technology departments have lost ground in the resource expenditure area when compared with expenditures for other institutional resources. It can be

concluded that information technology administrators believe that their departments are not being adequately funded and that this may indeed be a reality since the mean information system budget of the respondents was found to be only 3% of the total institutional budget. This hardly seems adequate when one considers the proliferation of campus computing resources in recent years.

2. The author's findings indicated that the respondent institutions charge computer lab fees less than 30% of the time; however, when lab fees were charged public institutions did so more frequently than private institutions. It can be concluded from this finding that institutions are reluctant to add additional fees even when it means that these fees could be used to expand technological resources to students.

3. The author's findings indicated that the respondent institutions charge technology fees less than 20% of the time; however, the private institutions were much less likely to charge the technology fee. It can be concluded that both institutional types have a reluctance to add more student fees, but that the private institutions with their higher tuition may also be more willing to absorb the costs of technology than are the public institutions. It is conceivable that the private institutions have already factored the cost of technology into their tuition. Other related conclusions could be that public institutions may have tuition caps which force them to resort to fees to raise additional revenue and that tuition increases are unpopular with parents, taxpayers, and students while fees for specific services are more acceptable.

4. The findings indicated that when schools charged technology fees the distribution of the fee went to departments other than information systems. It can be concluded from this finding that institutions may be using technology fees for purposes other than funding information technology resources.

Recommendations

Information technology in higher education merits more research, particularly research that concentrates on small institutions. The author's study has tried to contribute some understanding of the finance/budgeting issue as it related to the application of technology and computer lab fees in institutions with 5000 students or less. Further studies should be undertaken concerning issues of technology in small colleges and universities since so little research is devoted to these types of institutions and yet these institutions make up the majority of higher education. Future researchers should try to determine if institutional budget or size impacts technology issues.

The information system administrators that responded to the author's study appeared to perceive that their departments were losing ground in the institutional budget wars. Future studies could examine more closely when a lack of adequate institutional financing of information systems is endangering the spread of technology on the campuses and impacting the institution's ability to compete in this "Information Age."

Another issue that should be closely examined is the hidden costs of computing. Future studies should closely examine the issue of end-user computing. There is little doubt that such hidden costs could have a major impact on small institutions with limited resources.

Finally, the ubiquity of information technology in our society forces even the smallest institution to provide a computing environment on campus. The important question is not which systems or software to offer, but how to fund technology and how to allocate limited financial resources to cover the costs of the spiraling cycle of constant technological change.

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Appendix
Tables

Table 1

Demographics about the Institutions

Categories	Number of Institutions	Percent of Institutions
Type of Control (n=350)		
Public	127	36.3
Private	223	63.7
Size of Institutions (FTE Student) (n=350)		
0-199	1	.3
200-499	4	1.1
500-999	40	11.4
1000-2499	170	48.6
2500-4999	130	37.1
5000	5	1.4
Total IS Budget (Dollars) (n=350)		
Not Reported	7	2.0
200,000 or Less	18	5.1
200,001-400,000	68	19.4
400,001-600,000	65	18.6
over 800,000	136	38.9
Total Institutional Budget (Dollars) (n= 350)		
Not Reported	7	2.0
10 Million or Less	39	11.1
10,000,001-20 Million	97	27.7
20,000,001-30 Million	84	24.0
30,000,001-40 Million	40	11.4
40,000,001-50 Million	36	10.3
50,000,001-60 Million	20	5.7
Over 60 Million	27	7.7

Table 2

Relationship Between Institutional Types and IS Budget Compared to Inflation Rate

	Matched 1	Exceeded 2	Lagged 3	Don't Know 4	Row Total Row %
Public					
Actual Count	16	37	58	16	127
Exp. Count	18	44	50	15	
Total %	4.6	10.6	16.6	4.6	36.3
Private					
Actual Count	34	84	78	26	222
Exp. Count	32	77	86	27	
Total %	9.7	24.0	22.3	7.4	63.7
Column Total	50	121	136	42	349
Column %	14.3	34.6	38.9	12.0	100
Chi-square	Value		DF		Significance
Pearson	5.11		3		.27605

Table 3

Relationship Between Institutional Types and IS Expenditures Compared to Other Expenditures

	Matched 1	Exceeded 2	Lagged 3	Don't Know 4	Row Total Row %
Public					
Actual Count	35	49	28	15	127
Exp. Count	29	51	28	19	
Total %	10.0	14.0	8.0	4.3	36.3
Private					
Actual Count	46	92	49	35	222
Exp. Count	52	90	49	31	
Total %	13.1	26.3	14.0	10.0	63.7
Column Total	81	141	77	50	349
Column %	23.1	40.3	22.0	14.3	100

Chi-square	Value	DF	Significance
Pearson	3.25	3	.51730

Table 4
Relationship Between Institutional Types and IS Budget Priority Increase

	Yes (1)	No (2)	Row Total Row %
Public			
Actual Count	73	54	127
Exp. Count	79	48	
Total %	20.9	15.3	36.3
Private			
Actual Count	146	77	223
Exp. Count	140	83	
Total %	41.7	22	63.7
Column Total	219	131	350
Column %	62.6	37.3	100
Chi-square	Value	DF	Significance
Pearson	2.68	1	.26242

Table 5

Relationship Between Institutional Types and the Charging of Computer Lab Fees

			Row Total
	Yes (1)	No (2)	Row %
Public			
Actual Count	48	79	127
Exp. Count	36	91	
Total %	13.8	22.6	36.4
Private			
Actual Count	50	172	222
Exp. Count	62	160	
Total %	14.3	49.3	63.6
Column Total	98	251	349
Column %	28.1	71.9	100
Chi-square	Value	DF	Significance
Pearson	9.33	1	.00229

Table 6

Relationship Between Institutional Types and Distribution of Computer Lab Fees

	Gen Fund 1	Acad Dept 2	IS Dept 3	Other 4	G.F/ Other 5	G.F./ Acad 6	Row Total Row %
Public							
Actual Count	25	13	1	7		2	48
Exp. Count	24	15	2	5		2	
Total %	25.5	13.3	1.0	7.1		2.0	49.0
Private							
Actual Count	23	17	5	3	2		50
Exp. Count	24	15	4	5	2		
Total %	23.5	17.3	5.1	3.1	2.0		51.0
Column Total	48	30	6	10	2	2	98
Column %	49.0	30.6	6.1	10.2	2.0	2.0	100

Chi-square	Value	DF	Significance
Pearson	8.85	5	.18241

Table 7
Relationship Between Institutional Types and Charging a Technology Fee

	Yes (1)	No (2)	Row Total Row %
Public			
Actual Count	34	93	127
Exp. Count	24	103	
Total %	9.7	26.6	36.3
Private			
Actual Count	32	190	222
Exp. Count	42	180	
Total %	9.2	54.5	63.7
Column Total	66	283	349
Column %	18.9	81.1	100
Chi-square	Value	DF	Significance
Pearson	8.63	1	.01340

Table 8
Relationship Between Institutional Types and the Distribution of Technology Fees

	Gen Fund	Acad Dept	IS Dept	Other	Row Total
	1	2	3	4	Row %
Public					
Actual Count	6	1	13	14	34
Exp. Count	13	2	11	8	
Total %	9.1	1.5	19.7	21.2	51.5
Private					
Actual Count	20	2	8	2	32
Exp. Count	13	1	10	8	
Total %	30.3	3.0	12.1	3.0	48.5
Column Total	26	3	21	16	66
Column %	39.4	4.5	31.8	24.2	100
Chi-square	Value		DF		Significance
Pearson	18.02		3		.00044

Table 9
Post Hoc Test

Relationship Between Institutional Types and Distribution of Technology Fee Between the General Fund and Other Funds

	Gen Fund 1	Other 4	Row Total Row %
Public			
Actual Count	6	14	20
Exp. Count	12	8	
Total %	14.3	33.3	47.6
Private			
Actual Count	20	2	22
Exp. Count	14	8	
Total %	47.6	4.8	52.4
Column Total	26	16	42
Column %	61.9	38.1	100
Chi-square	Value	DF	Significance
Pearson	16.48	1	.00005

(The .05 alpha level was adjusted using the Bonferroni method to .002 alpha level.)

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Organization:	Various
Year:	2000
Abstract:	In this follow-up session to last year's discussion of how to successfully negotiate a new CIO position, the next step in the process will be analyzed. When a senior IT manager accepts a new job, there is an initial period during which decisions and actions can greatly impact her/his chances of succeeding in the position. What are the opportunities and pitfalls to be aware of during the "honeymoon?" A panel of CIOs will discuss their experiences, provide guidelines for assessing opportunities, and share what they would have done differently.

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Author: Jerry D. Campbell

Organization: University of Southern California

Year: 2000

Abstract: There is some argument today about whether or not the Internet qualifies as a library. With the goal of defining and projecting the library of the next generation, this presentation will address this issue as well as the evolution of archiving techniques, the future of intellectual property, and the emerging for-profit library revolution.

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Title: The Creation, Care, and Feeding of a Knowledge Base: Practical Advice

Author: Jonathan Bolte, Beth Norzinskay, and Sue B. Workman

Organization: Indiana University

Year: 2000

Abstract: Over the past dozen years, the Computing Support Center on the Bloomington campus of Indiana University has grown a knowledge base that is a key component in the support strategy at IU. In this paper we share some of what we've learned about the hows, whats, and whys involved. The intention is to provide some practical information that can assist those who are just beginning the process of building a similar tool or who are looking for ways to improve what they currently have.

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The Creation, Care, and Feeding of a Knowledge Base: Practical Advice

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Abstract: Over the past dozen years, the Computing Support Center on the Bloomington campus of Indiana University has grown a knowledge base that is a key component in the support strategy at IU. In this paper we share some of what we've learned about the hows, whats, and whys involved. The intention is to provide some practical information that can assist those who are just beginning the process of building a similar tool or who are looking for ways to improve what they currently have.

Introduction

There has been a growing interest in how knowledge bases can contribute to providing better and more cost-efficient IT support in both schools and businesses. And while we may not yet have consensus on a metric to support a cost/benefit analysis, the intuitive benefits seem to be clear.

A knowledge base:

- Can make it possible for people to help themselves rather than having to use more expensive human resources
- Can be made available around the clock, 24/7/365
- Can make information available for reuse for different purposes by different units or departments – reusable intellectual property
- Can function as a repository of information about legacy systems that new support staff have never experienced – an institutional memory.
- Can capture the knowledge that people possess before they move on to the next job
- Can provide a consultant with the collective expertise of a whole community of Subject Matter Experts
- May help reduce those long queues on the phone line or in your walk-in facility
- And if it doesn't reduce the number of direct contacts you get at your help desk, a greater percentage of those contacts will be for problems that really require expert help

Definite benefits have been realized at Indiana University. The Knowledge Base at Indiana University has proven itself to be a key asset for its users. It has received recognition from the national media and garnered awards from the Society for Technical Communication, the Association for Telecommunications Professionals in Higher Education, and Educause.

Because we've enjoyed success with our Knowledge Base at Indiana University, we've been asked lots of questions. We appreciate the opportunity to share some of what we've learned in the last ten years about the creation, care, and feeding of a knowledge base.

The presentation begins with a brief description of the Knowledge Base, its origins, and its use. Following this, we will address a host of common questions. The discussion is organized under four headings that represent the logical sequencing of tasks associated with information management: identification of content, collection of information, dissemination to users, and maintenance.

A brief description of the IU Knowledge Base

The IU Knowledge Base is a tool used to share information about computing and information technology as used by students, faculty, and staff at IU. It contains more than 6,700 documents. Most of these documents are in question/answer format, with an average length of two screens. There are more than 24,000 cross references among documents within the KB (about four per document) and more than 4,600 links to resources outside the KB. Access is provided using a search engine at http://kb.indiana.edu/ . Approximately 10% of KB documents are also available through a menu interface at http://kb.indiana.edu/menu/ . A new interface that combines new search capabilities and a comprehensive menu interface is nearly complete and should be available next year.

Origins and Use of the Knowledge Base at IU

The KB was created in the late 1980s as a consultant tool in the Computing Support Center on the Bloomington campus of Indiana University. The Support Center was, and remains, the front door for help with information technology on the IUB campus. The original content of the KB came from a set of answers that consultants wrote in response to questions received by e-mail. The answers were saved and organized as files that could be inserted into e-mail messages sent as responses to similar questions from other users. The benefit to the consultants who composed and saved the information was obvious and immediate. Inserting a previously saved text was much easier and quicker than rewriting the same information over and over.

A realization quickly emerged that other consultants would benefit if they had easy access to this information. "Easy" meant a computer-based searchable database, not another printed document to join the materials already waiting on overflowing bookshelves and stuffed in file drawers.

Funding was provided to pursue a solution. Options were few and the original efforts less than satisfying. Then, with the advent of gopher, a door opened and we ran through. Now our consultants had easy access to all those answers to questions that our users were asking by using a simple search box. And, of course, the user population had access to gopher as well, so it was a short step to transform what originated as a consultant tool into a self-help tool as well. The advent of the World Wide Web made possible better interfaces, and made for easier access and management. At this point, senior management made a major long-term commitment to growing this tool. Over the years, content and functionality were added and a good tool became a great tool.

The Knowledge Base is still used as a key consultant tool within its original home, the Computing Support Center, but it has essentially become a self-help tool for the end user. The Knowledge Base also functions now as a tool used by many other units within University Information Technology Services to help those whom they serve, e.g., the Education Program, Security, Messaging, Network Operations, Web Technologies, Policies Office, the Office of Planning and Communications, Database Management Services, and Departmental Support. In addition, it supports new initiatives like IU's distributed learning application (Oncourse) and tutorials licensed from NETg. Today, the KB serves users on all eight Indiana University campuses, a population over 100,000.

We think some important aspects of our experience are related to our success:

- The IU KB began as a grassroots effort.
- The people responsible for creating it were the immediate beneficiaries.
- Content was directly related to user questions.
- It began within a group that already had a culture of sharing.

- Senior management supported the effort very early in the process.

The following are offered as suggestions that flow from our experience:

- Starting small allows you to iron out the problems that would be unmanageable in a larger initiative.
- Look for people who are already sharing information. They understand the core principle upon which a knowledge base must be built: sharing.
- Offer to help them by providing tools to make what they already do easier. Choosing the right tools is easy, compared to changing a work culture based on hoarding information or hostility.
- Pay attention to current work practices, and try to integrate the new procedures into what is already familiar.
- Make sure the people who do the work experience the benefit immediately.
- Be ready to offer support at the right time.
- Be careful. Multiple grassroots KBs can develop. Integrating across units takes leadership and a clear directive.

The importance of overcoming obstacles to sharing cannot be overstated. It is easy to unwittingly support the opposite.

About collecting content

Where do you go for content?

It's already been mentioned that the place to start is with the person already sharing information. This is the person who can benefit immediately from a knowledge base. This is also the person who knows what users want to know and how to explain it.

The next people to approach are Subject Matter Experts. These are the people who are constantly fending off interruptions while they try to apply their knowledge to tasks that require their unique expertise.

Finally, you need to identify communication channels that can be monitored: change management minutes, distribution lists, workgroup meetings, etc. If these information sources don't exist, they have to be created. Solicit feedback from those who use the KB. Watch the Web logs for your KB site to see what people are looking for.

Notice the assumption that most of the information will be provided by experts outside the team that is managing the knowledge base. Another approach is to hire technical experts, whose job it is to research and write the documents from scratch. This approach has several shortcomings. It severely limits the breadth of coverage; also, only a limited number of documents can be made available.

In the approach used at IU, everyone contributes to the process according to their specific expertise. The Subject Matter Experts are not expected to produce a finished document, or even a draft. They are only expected to make the KB team aware of the need for documentation and provide the basic accurate content. Skilled writers produce the document, which is then reviewed by a content expert.

How can you overcome the resistance to sharing information?

In the academic environment, hoarding of information is less of a problem than is lack of time. The people who have the information are busy doing their jobs, and they are not anxious to add the additional role of information provider for the knowledge base to their job description. For information collection to be successful, these information providers have to see the benefit to themselves. Their jobs have to become easier because they've contributed.

Acknowledge that additional work is being required, but don't apologize. The message should not be, "Please help us build a knowledge base", but "We're here to help you do your job." The ultimate goal is to cultivate the understanding that the knowledge base is a service for the information provider as well as for the customer.

Following are some specific things you can do. All have as their objective to make sure that the people who are contributing information see the benefit to themselves and their users, and to make sure that their participation requires as little additional effort as possible.

- Learn about the way people currently work, and integrate your tool for collecting information into the normal workflow. For instance, consultants need a way to capture information for the knowledge base right in the midst of helping a customer. The trouble tracking tools used at IU allow us to capture and manage this information easily.
- Provide templates to assist them in providing information.
- Be flexible. Provide multiple means for people to submit information (e.g., e-mail, phone, Web forms, distribution lists, face-to-face meetings).
- Get submission into the KB in a timely manner. Not only are people waiting for access to the information, the delay can kill the motivation to those who contribute information. At IU, the time from submission of a document to availability in the KB is less than a week.
- Let people know what's happening with the information they've submitted.
- Provide a way for priority information to be made available immediately.
- Don't recruit information providers without going through the manager. This should be a negotiation. "We'll provide you with this kind of service, you will manage the process on your side, making sure we get the information."
- Provide managers with reports detailing the KB work done by their team.
- Use both formal and informal lines of communication with information providers. Get to know the people involved and get a feel for the constraints and pressures associated with their jobs.

About making content available

Where is the KB available?

The Web is, of course, the key vehicle. We do not make the KB available on CDs, because we would no longer have the ability to update it. The computing environment is so dynamic that having CDs floating around would ensure that people would access incorrect/old information. For the same reason, we encourage other units and institutions to point to information in the IU Knowledge Base, rather than copying it. It's disconcerting to know that there are documents out there bearing our name, as the copyright requires, that may very well contain errors that have long since been revised and updated in the Knowledge Base itself.

The text search and menu interface on the Web were mentioned earlier. We are exploring two other vehicles a well. In IU's online distributed learning application, Oncourse, we've provided a menu and search box tool restricted to documents related to this specific application. http://oncourse.iupui.edu/help/kbdocs.html

In the case of our Web-mail application, KB documents function as the actual help system within the application.

Two other growing uses of the KB are the inclusion of links to KB documents within e-mail, and printed documents. For instance, when our security team announces the arrival of a new virus on our campus, they typically point to articles in the KB that describe the virus more fully and guide the user through the process of removing it. Links to KB documents function as a kind of shorthand.

Providing access to KB documents inside online applications and as links in e-mail announcements is a way to deliver content right at the point it's needed.

What else is done to enhance accessibility?

- The KB is reliable. The KB is twinned on two Sun UltraSparc servers running Solaris 5.6. The machines are backed up daily.

Our editing environment resides on a Sun Enterprise 250 with a RAID array.

- Searches are very fast. The index of documents and all the documents themselves are cached. This is important, since documents are built from several elements that reside in different tables and files.
- Hidden terms have been associated with documents to assure that users can find what they want, even if they don't use the right term. There are over 65,000 of these, an average of 12 per document.
- The KB orders search returns to place the most likely documents first in the return list.
- The documents in the IU KB are cross-referenced to related texts within the KB. There are 25,000 cross-references.
- Because the KB serves seven campuses and contains lots of campus-specific information, the KB is designed so that, by default, documents specific to a campus are only returned to searches originating on that campus. Entire documents and parts of documents can be manipulated in this way.
- The IU KB also functions as a portal to 5,000 links outside the KB.
- Clarity, accuracy, consistent formatting, and predictability all contribute to readability and make the information more accessible. KB editors have created an extensive Style Guide and use a UITS-wide Standard Terms List to support this effort.
- Accuracy is achieved through review by content experts and at least three sets of editor eyes in the peer review process.

About Maintenance

What process is used to keep documents updated?

Our goal is to review every document every year. At this time, the average time since last revision across documents is 67 weeks.

Documents come up for review in several ways.

- Consultants in the Support Center suggest revisions when they encounter problems during the normal course of their work.

- Users contact us using a form available on the Web or by writing directly to us. Information providers do this as well.
- When KB editors become aware of changes to systems and services (through monitoring newsgroups, meetings, change management reports, etc.), they will search the KB to identify documents that will require revision.
- In addition to all these, we have a program that calculates a value for each document, based on the number of times it's been accessed and the length of time since it was last reviewed. Using this value to identify those documents most in need of review, editors usher a specified number of these through the review process each week.
- The process is supported by meta-information that is associated with each document. This includes date of creation, last modification, last verification by an expert, author, resource person to contact, etc. In addition, various statuses are assigned to documents, indicating the stability of the information (the "dir" command in DOS is not likely to change anytime soon, for example), and the relative need for review ("awful" means the information is correct, but the writing stinks). There may also be an expired date set for a document that will force it onto our to-do list at a specific time.

Last year over 5,000 revisions were made to existing documents. This year we are on an even faster pace.

As mentioned previously, there are approximately 5,000 links to pages outside the KB. A link check runs weekly and three editors review the output and make any necessary repairs.

Another weekly task related to improving the KB is the analysis of searches that do not return any hits. These goose-eggs, as we call them, suggest documents that need to be written, or needed revisions to existing documents that will make them easier to find.

How do you know if you're doing a good job?

This is the ultimate maintenance question, and we do devote some effort to answering it.

We've conducted extensive usability tests in the past. These revealed some problems that we've addressed. We are strongly committed to usability testing and more is planned for next year. (Our weekly analysis of the search logs is directly related to usability.)

Surveys are done as well. A few questions about the KB are part of a yearly survey conducted for University Information Technology Services. We also contact several users each week with a three-question survey. A longer survey has been constructed and will have been distributed to 2,000 users by October of this year.

Last semester, we partnered with a graduate student in Information Systems Technology in an effort to define some new tools to measure how well we're doing our job. This student is doing an evaluation of the IU KB as his dissertation. He's conducted interviews with a variety of stakeholders, both inside and outside UITS. He also conducted a focus group with users. The extended survey mentioned above was constructed as a result of his study.

Our participation in various competitions has also let us know how we stack up along certain dimensions.

Also, we track a number of quantitative measures related to usage and maintenance, some of which have been discussed here.

Conclusion

The IU Knowledge Base has developed over a period of a dozen years. While it is probably much larger and more elaborate than the proverbial 20% that will meet 80% of your needs, we hope our experience will be useful to you. The basic lessons have been:

- A knowledge base is less a matter selecting tools than it is a matter of building a culture.
- Creating a knowledge base is not a single act of creation. It is an ongoing creation. Prepare for this at the outset.
- Don't go it alone. Enlist the people already doing the job on a smaller scale.
- Formal and informal partnerships are a must if your KB is going to reach any size.

- Identify the key content. It's probably less than you think.

EDUCAUSE Information Resources Library

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0007

Title: The Full Monty: Two Mutually Incompatible Views of Organizational Convergence

Author: Martin J. Lewis and Christine Sexton

Organization: University of Sheffield

Year: 2000

Abstract: At Sheffield, the Library and Computing Service formed a new Division of Information Services in 1999. Concurrently, the two services achieved breakthroughs in formulating corporate information strategy and planning new learning space. Featuring extensive personal abuse and recrimination, two senior managers will in this session extract general truths from their experience of organizational convergence.

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The Full Monty: two mutually incompatible views of organisational convergence that leave nothing to the imagination

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Abstract

At the University of Sheffield, the Library and Computing Service formed a new Division of Information Services in 1999. Concurrently, the two services achieved breakthroughs in formulating corporate information strategy, and planning new learning space. This paper looks at the issues arising from organisational convergence and re-alignment, specifically in terms of the relationship between IT and library services. It puts these in a national UK context and also looks at some of the cultural issues involved in working relationships within these two key arms of the higher education information infrastructure.

The Full Monty: two mutually incompatible views of organisational convergence that leave nothing to the imagination

Authors: Martin Lewis and Christine Sexton

This paper considers the issues arising from organisational convergence and re-alignment, specifically in terms of the relationship between IT and library services. It puts these in a national UK context and also looks at some of the cultural issues involved in working relationships within these two key arms of the higher education information infrastructure.

The University of Sheffield is a large and successful research-led UK University with some 20,000 FTE students. Historically, it had three principal information services: the Library (which by North American standards is of modest size, with some 1.4 million items, 160 staff and an annual budget of $8 million); Academic Computing Services (responsible for the network infrastructure, student computing and support for IT-intensive research); and Management and Administrative Computing (focused on payroll, student and staff record systems). In 1996 this last service became Corporate Information, when it added responsibility for the University web presence; and in 1997 Corporate Information and Academic Computing merged to form Corporate Information and Computing Services (CiCS), with an institution-wide remit for IT infrastructure and support, 125 staff and a budget of $10 million. In 1999, a new unit -the Division of Information Services - was established to achieve integration of planning and resourcing for the Library and CiCS. The services are currently managed separately within the new Division, but opportunities for closer working on a range of issues are being evaluated. Until recently this unremarkable - and possible typical - picture hid a good deal of anxiety and uncertainty. Below we try to explore how these tensions arose and examine some of the misunderstandings that caused them, with particular attention to the human resources dimension.

The range of organisational relationships between libraries and computing services has been a recurring theme in our conference and journal literature - and not least at Educause conferences - over the last decade. The possibilities and trends have been well explored by Creth and others in North America (1), and by Pugh and Lovecy in the UK (2,3). Nevertheless, the experience of each institution is different, and events at the University of Sheffield over the last few years suggest that our experience, while not untypical of many large institutions, may have some value for others, if only in helping them to avoid some pitfalls.

As a starting point, we want to identify and characterise some of the organisation tensions that existed (and to some extent still exist) between the Library and the Computing Service during the 1990s.

The first of these is the traditional tribal tension between the two units. It's astonishing to reflect on how *little* interaction there was between them until the last decade, being limited to modest technical collaboration over the library management system and the annual import of student registration data. Mostly this collaboration was carried out by systems staff, and there was little or no discussion of strategic matters. The introduction of PCs and the first tentative use of the internet instead of dedicated networks for mediated bibliographic database searching brought further contact, but still at a technical level.

The first sign that the relationship was going to change in a major way came with the advent of CD-ROM in the Library in the late 1980s. To the Computing Service, CD-ROM was an interesting technical development that did not impact on their core business. To the Library it meant a transformation of the way in which information sources and search facilities were made available to end-users, and the number of CD-ROM installations increased rapidly. However, during this early phase librarians had to get their screwdrivers out and install the PC cards for their CD-ROM players, set breakers, and generally provide their own technical support. The librarians were not impressed. But the computing staff were similarly unimpressed that a client department had taken it upon itself to adopt a new technology without discussing the support implications first. Their view was that the librarians had decided to go it alone by not asking for any technical support, so why should any be offered?

Networking CD-ROM was the next battlefield. It was the early adoption by the UK's Health and Safety Executive of CD-ROM as a medium for distributing both its own data and its bibliographic database that prompted Computing Services to find technical solutions to the need to network CD-ROM across the campus, and not the pressure from the Library. Eventually, however, the sheer volume of applications, and pressure from end-users, meant that the two services began to get their act together. These early skirmishes took place without the Service Directors' involvement, but they set the tone for collaboration for some time.

A major factor in the relationship between libraries and computing services in the early 1990s was the contrasting management cultures. In Sheffield, as elsewhere, the Library was more hierarchical in its management structure, and oriented towards handling large volumes of face-to-face interactions with patrons. As the Library saw it, the Computing Service had large numbers of senior staff with responsibilities that seemed poorly defined, and relatively little contact with patrons, especially undergraduates. However, in the Computing Services' view the Library's very vertical structure meant that they were too bureaucratic, and had more senior staff than was strictly necessary. One consequence of this was the development of multiple, and sometimes conflicting, channels of communication. Around this time, in the UK, the first steps towards mergers of libraries and computing services were being taken, partly in an effort to improve coordination, but also with the objective of achieving economies of scale. Sensitivities about whether such change was on the agenda at Sheffield were heightened with the retirement of the Director of Academic Computing Services in 1995.

The Web brought more tension. The first web server was a collaboration between Computing Services and an academic department, and the first central web server was launched by Computing Services in 1993. However, it was the Library that recognised the need for a managed corporate web presence, and bid successfully for the funds for a project to establish the University's Campus Wide Information System (CWIS). Although the CWIS was delivered, and was one of the first UK services, having different units responsible for the content and the server (and registration) proved unsatisfactory. A great deal was accomplished in the CWIS in terms of content, but this had been achieved at the expense of a corporate look and feel, navigation and usability. A new department, Corporate Information, was therefore set up in 1996 to bring together the corporate web presence, administrative computing and management information provision.

It was increasingly apparent that Academic Computing Services and Corporate Information shared a common network infrastructure and staff skills, and that there was merit in merging them, to create the new Department of Corporate Information and Computing Services (CiCS) under the leadership of an Administrative Director.

This organisational change naturally gave rise to speculation about whether further consolidation of information services, involving the Library, might be on the agenda. By 1997, the two big information services had similar numbers of staff and similar-sized budgets. Merging them would create the largest single management unit in the institution. Would it happen? And if it did, who would win?

There was no formal debate about merger, because at this stage the various components of CiCS were dealing with the major organisational challenge of operating as a single department. And the Library was no keener to have responsibility for computing than it was to be in charge of car parking. Nevertheless, the fact that the possibility hung in the air for a while highlighted some continuing anxieties.

Among some Library staff, there was concern that the relatively new business area of electronic content might somehow be gobbled up by CiCS, leaving the Library to deal with the print collections and the important, though declining, business of issuing books to patrons. Already, it was noted that nowhere in the top level web pages for the new CD-ROM server did the word "Library" once appear. Yet the Library owned those databases! It paid for them, it had owned the print-based predecessors of most of them, and it delivered the information skills teaching that enabled patrons to use them! To CiCS this argument was futile - it had spent a considerable amount of time evaluating the technologies necessary to deliver networked CD-ROM's, it had paid for the CD-ROM server, installed and commissioned it, and dealt with user problems through its Helpdesk. All the

Library had done was sign a few order forms and moan when things didn't quite work! The thought that this would be so much easier if it was all managed by the same department was voiced in a number of corridors and coffee rooms in CiCS.

The expansionist tendencies in the Library, though uninterested (apart from personally) in business areas such as the payroll and network management, thought that now might be a good moment to send in the 82nd Airborne and annexe CiCS' user services activities, such as student PC clusters (some of which were in any case within Library buildings). At around this time, the two units' Directorates, aware of these anxieties, started a series of liaison meetings to explore areas of shared interest and to reassure staff in both that there was no hidden merger agenda.

Two factors helped to put these anxieties into perspective. One was a period of tight financial restriction which concentrated minds throughout the academic services on the continuation of existing core services. The second, and more important, were new opportunities that followed the appointment at the start of 1999 of a new Registrar and Secretary (the chief administrative officer). We look in more detail at these opportunities, and the progress that was made, below.

Meanwhile, in the UK Higher Education sector, by 1998 some 50% of institutions had achieved a degree of converged or merged management. In over 80% of the cases where a single manager was in charge of the integrated service, that manager was a librarian. For a humorous review of the cultural factors, see the report of a debate held in Manchester in 1998 at a conference entitled "50 Years of Information Developments in Higher Education" (4). In a more serious reflection on the differences, Phil Brady (5), one of the small number of IT professionals managing converged services, has commented: *"There is a huge cultural difference. I see librarians as working more with certainties, while IT involves unpredictability, uncertainty and to some extent trial and error. Most IT people will admit to an incomplete understanding of their craft, and there is maybe a greater need to rely on the expert knowledge of others."*

There are almost as many models of organisational convergence in the UK as there are universities, but they can be loosely sorted into three categories:

(i) fully converged at all levels, with service delivery from integrated service points using multiskilled staff

(ii) an integrated management structure, but service delivery and operational management from separate service points

(iii) separately managed services under the coordination of a single senior officer (usually at Pro-Vice-Chancellor/Registrar/Vice-Provost level), sometimes with a title such as "Director of Information Services".

Frequently, other services than library and IT are brought within the converged service, most commonly media production, and learning and teaching development. Responsibility for University Presses (where they exist) is less commonly included, in contrast with the US.

The march of convergence, however, has slowed in recent years, and there have been some high-profile examples of de-convergence. Moreover, there has been much more enthusiasm for mergers in the so-called "new" universities (those chartered in 1992, and which were formerly Polytechnics). In general these institutions are characterised by an emphasis on learning and teaching, on applied subjects, a relatively small (though growing) research base, and smaller library and computing services. Among the 20-strong Russell Group, the UK's heavy-duty research-led universities, only one (the University of Birmingham) currently has a fully-integrated Information Services unit, described in detail by Field (6).

In parallel with the process of institutional-led organisational change have come a number of external drivers for change in the UK. One of the most important agencies in this respect is JISC, the Joint Information Services Committee (7), which is jointly funded by the Higher Education funding agencies in Wales, Scotland, Northern Ireland and England. JISC has been hugely influential in both the library and computing areas, managing the UK's eLib programme for electronic library development, and the SuperJANET high-bandwidth network that links all universities in the UK.

In 1995 JISC published its guidelines for developing information strategies (IS) in universities (8). These were backed up by the requirements of the funding agencies that all universities should develop information strategies as an integral part of their corporate plans. The guidelines followed extensive consultation with the community, and were prepared jointly with the management consultants Coopers & Lybrand. The guidelines defined an IS as follows:

an Information Strategy is a set of attitudes in which:

- *any information that should be available for sharing (and most will be) is well defined and appropriately accessible (allowing for necessary safeguards);*
- *the quality of information is fit for its purpose (eg accuracy, currency, consistency, completeness - but only as far as necessary);*
- *all staff know, and exercise, their responsibilities towards information;*
- *there is a mechanism by which priorities are clearly identified and then acted upon.*

Six pilot institutions were selected to implement the guidelines, but take-up in the sector, and progress with developing information strategies, was slow. This reflected in part the substantial length of the guidelines, and the rigorous approach to identifying information needs and flows implied by them.

The policy push behind the development of IS by each university was renewed by the Dearing Report of 1997 (9), the most comprehensive review of Higher Education in the UK since the 1960s, which stated:

"we recommend that all higher education institutions in the UK should have in place overarching communications and information strategies by 1999/2000".

JISC followed this up by issuing a much more concise and pragmatic set of IS guidelines in 1998 (10), appointing a national co-ordinating officer for IS development, and holding a series of conferences and workshops to help institutions make progress with the IS process. Nevertheless, the new guidelines still emphasised the primacy of understanding information needs and undertaking an information analysis; and while most if not all universities will have sections in their corporate plans headed "Information Strategy" by 2000, by no means all of them could claim to have produced and implemented a coherent information strategy.

In the University of Sheffield, the 1995 guidelines were considered by a committee, composed entirely of academic staff, which produced an extensive paper about how to approach an information strategy, without actually starting the process of writing one. Similar papers entitled "Toward an Information Strategy" or "Developing an Information Strategy" emerged from other universities around the same time.

Earlier in this paper, we referred to new opportunities that followed the arrival of a new Registrar & Secretary in 1999. Not surprisingly, the Registrar & Secretary wanted to look at the organisation of academic services, where speculation about mergers and convergence was rife. An early conclusion was that there were no significant opportunities for economy to be achieved by merging the Library with CiCS; and that overlap between staff of the two services was actually very small. The Library's servers that ran its *Talis* library management system, for example, were already housed in CiCS' facility; and the Library's temptingly named Technical Services department was concerned with serials, bibliographic records and collection management, not IT. Recognising the need for better strategic coordination between the two services, a new Information Services Division was established, initially headed by the Registrar & Secretary, but with the possibility for a dedicated senior officer post to be created at some later date.

Accompanied by some relief that the speculation about organisational structures was now ended, attention turned to a number of areas of outstanding business, of which the Information Strategy was one. The authors of this paper were asked to move this forward, and to produce proposals for implementation. We approached this with three basic premises:

(i) that a substantial amount of the work that the JISC guidelines had identified had already been done: for example the Library already had a strategic plan, and CiCS had produced a number of written policies in areas such as data quality and data sharing;

(ii) that the JISC requirement for an information needs analysis, though important, was not in the critical path for writing an Information Strategy; and that in fact its compilation could be one of the early *products* of the IS;

(iii) the IS should be a framework document with a "light touch", regularly reviewed and updated, rather than a comprehensive account of how information is created and used.

Encouraged by these thoughts, a draft IS was produced by the authors by June 1999, and after appropriate consultation was approved by Senate and Council (the University's governing bodies) in December 1999. An IS Implementation Group has been established, and the process of developing the more detailed policies and processes is now underway. Making progress with the IS has been an important early achievement for the new Information Services Division.

A second critical area for attention was physical planning. The University Library's facilities were overcrowded and in poor condition, and expensive to operate, being distributed between ten sites. At the same time, CiCS' student PC clusters were cramped, and the level of provision, at roughly one PC for every 18 students fell well below the standard recommended in the Dearing Report (qv) of 1:10. The Library had produced a series of proposals for new or extended facilities in the 1990s, but due to the lack of both central funds and wealthy alumni (one respect in which UK University managers gaze wistfully across the Atlantic), none of these proposals had progressed beyond the scenario stage. In 1998 the Directors of CiCS and the Library made an important decision to consider the requirement for networked study places on campus as a shared one, reflecting the increasing need of students and researchers for integrated environments where they could use print-based and electronic resources. Following establishment of the Information Services Division, this decision led to a new joint proposal for a Learning Resources Centre (LRC). The LRC, expected to open in 2003, will feature student core text provision, along with a high level of networked PC provision and facilities for network access by patron-owned portable PCs. The proposal was strongly endorsed by the Registrar & Secretary, and is now incorporated into the University's Estates Strategy.

A third area in which CiCS and the Library are collaborating is the University's newly-implemented Service Quality Enhancement (SQE) process. This process is looking at ways of increasing service responsiveness, engaging with stakeholders in discussion of priorities, and developing a Service Level Agreement (SLA), that links resources to service delivery. The two services have worked together on the development of the SLA, a process which has improved mutual understanding of roles and responsibilities.

These early gains from improved collaboration - information strategy, physical planning, and service quality enhancement - have helped to boost confidence and morale among the staff of both services, and to reduce competition and suspicion between them. The pressure to maintain services within a static resource base, and to demonstrate to academic (faculty) colleagues that the services offer good value for money in the face of concern about institutional overheads on research income, are more significant that the tensions between the two services.

At the moment the Information Services Division is largely a planning and organisational concept; the two services currently operate under their existing "brands" (the Library's brand recognition in particular has been shown by surveys to be at a level higher on campus than those of some well known consumer brands nationally). Large-scale launch of the ISD as a public brand is likely as the commissioning of the LRC approaches.

So, having revealed (almost) all, can this picture of confusion and anxiety followed by renewed enthusiasm hold any lessons beyond Sheffield? We hope it can. In particular, we offer the following thoughts.

1. Users/patrons/clients generally couldn't care less about how the academic services are organised, so long as the right services are delivered, efficiently and effectively. The literature of organisational change may seem fascinating to us, but a customer-focussed organisation needs to leave it behind.
2. After several years of getting leaner and fitter, there's far less overlap, and far less scope for cost-saving, between libraries and computing services than one might have thought. Merging/converging is thus not a quick fix for institutional financial problems.
3. The library is *not* just another client of the computing service - it's a partner in the delivery of information and knowledge-based services. This first view of the library caused problems at Sheffield.
4. By the same token, the library cannot expect the computing service to drop everything just because the library has a problem.
5. Regular liaison and consultation between library and IT personnel are thus essential at both strategic and operational levels regardless of what the organisation chart looks like.
6. The concept of organisational convergence implies a symmetry between the forward progress of the two services that simply doesn't exist. The library may have more history, and more physical assets; but the computing services are much more mission-critical to institutional operation (think payroll) in the short term. Organisational integration between the services may be a more helpful model than convergence.
7. Finally, if things seem somewhat strained in your institution - they can get better!

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EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0085
Title:	UCITA: Enforceability and Fairness of Negotiated, Shrinkwrap, and Click-Through Licenses
Author:	James G. Neal, Rodney J. Petersen and Donald R. Riley
Organizations:	Johns Hopkins University, University of Maryland
Year:	2000
Abstract:	Many IT professionals have ignored or disregarded the fairness and enforceability of "shrinkwrap" or "click-through" licenses for computer software. However, the trend towards legal recognition of those license terms combined with new legislation that will extend those practices to all transactions in computer information in digital form or delivered via the Internet (including online databases, electronic journals, and e-books) is cause for alarm. UCITA (the Uniform Computer Information Transactions Act) is a uniform law that is being proposed in all of the states to govern contracts or licenses for digital information; consequently, it is a vehicle that is likely to have dramatic consequences for IT organizations, libraries, and educational institutions. This panel presentation will report on the status of UCITA in the states, outline some of its controversial issues, and suggest strategies for promoting higher education's interests.

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ARL

UCITA
Summary and Implications for Libraries and Higher Education

http://www.arl.org/info/frn/copy/ucitasum.html

Summary

The Uniform Computer Information Transactions Act (UCITA) is a proposed state law that seeks to create a unified approach to the licensing of software and information. Two states—Maryland and Virginia—have passed UCITA, and it will be under consideration in many other states in the near future. UCITA' s broad scope and focus on software and information requires that the research, education, and library communities understand what the adoption of UCITA will mean for the mission, operation, and core values of the higher education and library communities.

Background

UCITA has been under development for many years by the National Conference of Commissioners on Uniform State Law (NCCUSL). It is a very complex proposal, which makes difficult the full appreciation of all of the implications for the library and education communities. Throughout the drafting process, UCITA and its predecessor UCC2B (Uniform Commercial Code 2B)—the original effort to develop a new uniform legal framework in computer information transactions—were highly controversial to many diverse groups. Along with these other groups, the library community raised its concerns repeatedly during the drafting process. Unfortunately, the drafting committee did not address these concerns and UCITA remains problematic to many both in the commercial and non-profit sectors. Indeed, the American Law Institute, which initially collaborated with NCCUSL in the drafting of this uniform law, concluded that the law was so flawed that it abandoned its participation in the process. Furthermore, the attorneys general of 24 states signed joint letters raising serious substantive concerns with the potential adverse impact of UCITA on users of software and other information products. Similarly, the Federal Trade Commission filed comments critical of the proposal. Not withstanding these concerns, NCCUSL approved UCITA in July 1999 with the expectation that states would rapidly enact it uniformly, without modification.

UCITA has moved ahead in a number of states. Following extensive discussions and prior to passage, the Maryland General Assembly made some helpful changes to UCITA. Virginia passed UCITA, but delayed implementation to consider possible revisions to the statute. Several states began deliberations of UCITA, but decided it was too complex and controversial to enact this year. At the other end of the spectrum, the Iowa legislature passed a law designed to protect Iowa citizens from UCITA's provisions. Thus, because of local attempts to deal with the extensive concerns with UCITA, there is the strong possibility that there will be no uniform practice.

All facets of the research, education, and library enterprise rely upon software and information to create and disseminate knowledge. Indeed, members of these communities are both users and creators of these products and services and are among the largest consumers of information and software. Historically, the research, education, and library communities have looked to copyright law as the policy framework for balancing competing interests of the creators, publishers, and users of copyrighted works. UCITA will dramatically change this framework. Indeed, as with other recent intellectual property and copyright measures, the approach taken in UCITA will be a template for harmonization globally.

Legal Context

As noted in a letter to members of the Maryland General Assembly from leading intellectual property faculty,

> "until recently, federal copyright law and contract law have co-existed in relative harmony. Effectively, only copyright law governed works generally distributed to the public, while works with limited distribution could receive both copyright and contract protection. More recently however, software companies began distributing their products to the general public subject to shrinkwrap licenses."

As the use of shrinkwrap licenses by publishers grew, a subtle but important legal shift occurred. Courts previously skeptical of shrink-wrap or click on licenses became more supportive. UCITA codifies this growing, but not universal, acceptance by legalizing the use of click-on, non-negotiated licenses. The potential result will be the displacement of the uniform system under federal copyright law (that seeks appropriate balances between creators, users, and publishers) with a contract-based system that will operate under the flawed assumption that there is a level-playing field between licensors and licensees. This will not be the case for shrinkwrap licenses, also referred to as contracts of adhesion, where the licensor unilaterally sets the terms.

Since the inception of the digital environment, copyright has applied to digital works and the Internet. Moreover, in 1998, the U.S. Congress enacted the Digital Millennium Copyright Act (DMCA) to update selected sections of the Copyright Act to address the challenges of the digital environment. Proponents of UCITA claim that there is a need to provide a new legal framework to address digital issues, completely ignoring the DMCA and existing copyright case law. UCITA thus represents an end-run around the DMCA and the Copyright Act as interpreted by the federal courts. UCITA is a means to implement on a state level what UCITA proponents have not achieved on the federal level. UCITA creates a very different approach to intellectual property protection with no exemptions and fair use defenses for the research, education, and library communities.

Mission

A number of problems arise concerning the ability of institutions to carry out their missions under UCITA. In particular, UCITA has adverse impacts with respect to copyright, mixed transactions, and reverse engineering.

- **Copyright:** Copyright law has served as the primary legal and policy framework for balancing the interests of users and owners of copyrighted works in both the print and electronic environments. It is within this framework that libraries and educational institutions create and disseminate knowledge and information. UCITA represents a shift away from copyright law to contract law as well as a movement away from societal interests to a focus on economic interests. The rights and statutory exemptions that libraries and educational institutions are entitled to under copyright law, e.g. fair use, reproductions for class room use, preservation, and interlibrary loan—those provisions that balance the interests of owners and users—are likely to be prohibited through contract language enforceable as a result of UCITA. In addition, UCITA will lead to further erosion of the ability of these institutions to negotiate terms of use even in negotiable contracts. Increasingly, use will be more narrowly defined by the licensor in a climate of licensor control. This significant change has profound implications for how members of the library and education communities will be able to achieve their core missions.

- **Mixed Transactions:** Libraries and educational institutions purchase, license, and manage information resources in multiple formats—print, electronic, and microfilm. Some of these information resources may be mixed media, a book accompanied by a CD-ROM, for example. In a state where UCITA has been adopted, a publisher could extend license terms on the CD-ROM to the book. That could limit legitimate uses of the copy owned by the library. For example, the license may prohibit the library from lending of the sort clearly permitted under the first sale doctrine under federal copyright law. Or the license could prohibit the library from making a preservation copy of the book permitted under section 108 of the Copyright Act. The transparency that libraries increasingly seek to provide to users in working with a myriad of resources will no longer be possible.

- **Reverse Engineering:** University faculty, students, and IT professionals engage in reverse engineering for currently permissible purposes such as research and teaching, debugging, ensuring interoperability between systems, and security testing. Provisions in license agreements that prohibit this otherwise legitimate use of software would be enforceable under UCITA.

Operations

UCITA will likely increase the cost and complexity of doing business for libraries and educational institutions with regards to electronic self-help, the mass market license, and liability for known defects.

- **Electronic Self-Help:** Electronic self-help is the process whereby a licensor may electronically disable, remove, or prevent the usage of computer information or software. This may be done via "back doors" in the software that provide access to hidden commands that may be activated to disable it. Self-help presents numerous problems to libraries and educational institutions. First, these back doors pose significant security issues for the institutions. They enable hackers to access the institutions' network and this could cause serious damage. Secondly, mission critical software could be disabled if the licensor unilaterally decided that the institution was breaching any term of the contract under UCITA. Finally, self-help provides the licensor with the ability to monitor the use of the resource in the institution. As noted below, this raises significant privacy concerns.

- **Mass Market Licenses:** Licensing agreements that are "mass market" are not negotiated, such as click-on or shrinkwrap licenses. Under UCITA, when an individual acquires a piece of software and clicks on the "I agree" icon, she is bound by the terms of the license agreement. As we see with click-on licenses already, these terms more often than not prohibit or restrict fair use, reverse engineering, transferability, copies for preservation purposes, and more. The implications for the library and education communities are enormous. Increasingly, institutions provide faculty and staff with procurement cards, allowing decentralized purchasing of software and information from the distributor. A member of the faculty or staff could, by clicking on the license, waive the privileges and rights available to the individual and/or the institution under copyright law. To protect themselves, libraries and educational institutions may need to re-centralize the procurement function. Moreover, contract officers will have to scrutinize each shrinkwrap license to determine what conditions the licensor is trying to impose on the institution. Transaction costs, therefore, are likely to increase substantially.

- **Liability for Known Defects:** UCITA would allow software firms to waive liability for known defects in their software that they failed to disclose to their customers. This discourages software firms from exercising quality control, and could leave institutions without legal recourse for the damage caused by these known defects.

- **Choice of Law, Choice of Forum:** If a consumer decides to sue a licensor in a state that has adopted UCITA, the licensor, not the user, may choose the venue for the suit to be heard. The licensor may also choose the state law that applies. This is certainly not a level playing field between the consumer and the licensor. It presents significant economic barriers to the consumer and provides the licensor with much more clout concerning which court in which state will hear a case. Moreover, for negotiated contracts, a licensor may choose a state that has enacted UCITA, thus potentially limiting the ability of the institution to negotiate more favorable terms and conditions in the license. Finally, these provisions would be applicable to U.S. and Canadian institutions.

Values

Respecting the privacy of an individual and exercising the right to comment upon another's work are core values of the research, education, and library community. If adopted, UCITA is likely to pose serious challenges to upholding and maintaining these values in the library and education communities, indeed, in all sectors.

- **Privacy:** Electronic self-help permits a vendor to access the network or computer of the licensee as well as to monitor use of the software or information resource to ensure compliance with the terms and conditions of the license. The licensor performs this monitoring in order to track whether a use is allowed under the terms and conditions of the license. The ability to monitor and track use of information resources is at odds with the long-standing principles in libraries and educational settings concerning privacy and confidentiality.

- **First Amendment:** An important tenet of the research, education, and library communities is the ability to critique another's work, be it a software product or journal article. Under the UCITA framework, a term in a license agreement that prohibits public criticism or comment is presumed to be enforceable unless a court rules otherwise. It is unlikely that non-profit entities, including libraries and educational institutions, will have the resources or resolve to challenge outrageous license terms of this nature.

Conclusion

In sum, these concerns directly impact the ability of institutions to carry out their missions, to effectively manage operations, and to preserve and apply community values in the daily work of the institution. For faculty, library users, students, and staff the complexity of managing and accessing information will grow. Libraries and educational institutions are likely to pay more and get less. The costs of doing business will increase because staff in the library or elsewhere on campus will have to review each and every license to see what is and is not permitted. This will pull budgetary and staff time away from acquiring new resources because of the need to develop and manage license mechanisms, permissions, and the like. Thus for publicly funded institutions, UCITA will result in fewer public funds supporting public library and education programs.

Furthermore, one primary means to achieve greater parity is through enhancing access to information. Thus bridging the "digital divide" or resolving equity issues will be difficult at best in a UCITA environment. Under the terms and conditions of UCTIA licenses, resource sharing will be significantly undermined or even prohibited. Moreover, soaring license fees along with the inherent costs in retaining the necessary expertise for license negotiations is likely to diminish the available pool of resources normally devoted to acquisition of materials available for access and use by the library and education community.

For additional information, please contact Prue Adler (prue@arl.org) from the Association of Research Libraries or Rodney Petersen (rp72@umail.umd.edu)

Links to UCITA Resources

- The Association of Research Libraries' UCITA index
  <http://www.arl.org/info/frn/copy/ucitapg.html>
- The American Library Association's Washington, D.C. office offers basic information on UCITA
  <http://www.ala.org/washoff/ucita.html>
- The most recent version of UCITA, courtesy of Penn Law School
  <http://www.law.upenn.edu/bll/ulc/ucita/citam99.htm>
- Rodney Petersen on Licensing Digital Information and UCITA
  <http://www.educause.edu/ir/library/pdf/eq/a002/eqm002b.pdf>
- 4CITE, an organization dedicated to lobbying against UCITA, tracks latest news on its debate
  <http://www.4cite.org/HotNews.html>
- Letter from 38 professors of Intellectual Property law at various universities, opposing UCITA
  <http://www.arl.org/info/letters/profs_ucita.html>
- Statement by James Neal, Dean of the Johns Hopkins University Libraries, on UCITA before the Maryland General Assembly
  <http://www.arl.org/info/frn/copy/nealstmt.html>
- A Spring 2000 UCITA update from Rodney Petersen of the University of Maryland
  <http://www.arl.org/info/frn/copy/petersen.html>
- Computer consultant James Huggins on UCITA, NCCUSL, and uniform state laws
  <http://www.jamesshuggins.com/h/tek1/ucita.htm>
- Joint Statement on UCITA from several library associations to the Federal Trade Commission
  <http://www.arl.org/info/letters/FTC091100.html>
- Five Reasons Consumers Oppose UCITA, from the UCITA Consumer Advocates
  <http://www.nclc.org/ucita/index.html>
- Problems posed by UCITA for business users of software, as defined by the Principal Financial Group
  <http://www.arl.org/info/frn/copy/keyprobs.html>
- The letter signed by 24 state Attorneys General, opposing UCITA
  <http://www.arl.org/info/frn/copy/agoppltr.html>
- Joint Letter from library associations to Gene Lebrun, the President of NCCUSL
  <http://www.arl.org/info/letters/Lebrun7.12.html>

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0043

Title: What Do We Really Understand about the Cost of IT Support Services?

Author: Karen L. Leach and David L. Smallen

Organization: Colgate University and Hamilton College

Year: 2000

Abstract: For four years the speakers have been leading a collaborative effort among a wide range of institutions, to develop models for understanding the cost of IT support services. The year 2000 heralds a simplified data collection approach that provides a high-level picture of the totality of IT support services delivered in higher education. Results of this effort will be reported, including examples and real numbers.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0030

Title: A User-Centered Approach to Student Information Systems Design

Author: Calvin Chan and Osmond Chen

Organization: University of Wisconsin-Madison

Year: 2000

Abstract:

In writing applications to supplement PeopleSoft functionality at the University of Wisconsin-Madison, we were reminded that a user-centered iterative approach was the only way to ensure success. But what strategies can system designers employ to truly work from a user perspective? This paper will discuss our approach and its results. Electronic collaboration between the Graduate School and 120 academic departments virtually stopped with the new student information system. We needed solutions that suited over 200 users and a new approach that centered on the user and encouraged change as needs changed and as our understanding of processes improved.

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A User-Centered Approach to Student Information Systems Design

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8:15 a.m. - 9:00 a.m.
Canal A&B

Abstract

In writing applications to supplement PeopleSoft functionality at the University of Wisconsin-Madison, we were reminded that a user-centered iterative approach was the only way to ensure success. But what strategies can system designers employ to truly work from a user perspective? This paper will discuss our approach and its results.

Electronic collaboration between the Graduate School and 120 academic departments virtually stopped with the new student information system. We needed solutions that suited over 200 users and a new approach that centered on the user and encouraged change as needs changed and as our understanding of processes improved.

A User-Centered Approach to Student Information Systems Design

In writing applications to supplement PeopleSoft functionality on our campus, we were reminded that a user-centered iterative approach was the only way to ensure success. But what strategies can system designers employ to truly work from a user perspective? This paper will discuss our approach and its results.

Electronic collaboration between the Graduate School and 120 academic departments virtually stopped with the introduction of a new, vendor-provided student information system. Data entry was slow and the audit trail was not functional. Even for data viewing, training was long and expensive, and screens customized to meet user needs would require significant re-programming at considerable cost at each upgrade. We needed solutions that suited over 200 users in the central unit and throughout campus. We needed a new approach that centered on the user and encouraged change as needs changed and as our understanding of processes improved.

Admissions Process

The admissions process at the University of Wisconsin-Madison Graduate School is a distributed cooperative process. Considerable information moves back and forth between the Graduate School Admissions Office and the academic departments. The Graduate School Admissions Office is responsible for initial data entry, credential evaluation, confirming minimum Graduate School requirements, checking visa requirements for international applicants, and the final admit. For their part, the academic departments are responsible for the rest of the admissions process, such as, checking their own minimum requirements for admission, faculty review, and recommendation of admission.

After identifying critical processes that the new student information system could not handle, users and software engineers collaborated on a supplementary system. We identified users, analyzed our processes, identified gaps, and developed solutions. During the process, we identified and focused on two types of users: internal and external users. Internal users consisted of the Graduate School Admissions staff and external users included admissions staff from the academic departments around campus. We made some distinctions on the characteristics of each group. Then we put external and internal users together with the software engineers to create a prototype of the supplementary system. We implemented the system as soon as it had some useful functions. We worked closely with both internal and external users, consulting them at the earliest stage and at sequent iterations of the design and development process.

Internal and External Users

Internal users, consisting of the Graduate School Admissions staff, work in close proximity (one floor of one wing of one building). Since they work together on similar tasks and know each other well, it is feasible for them to check paper documents quickly if the need arises. They need to see what others in the Graduate School Admissions Office and what departments are doing with an applicant. Furthermore, they have a sizeable technical staff to help out with difficulties.

External users, include staff in 120 academic departments, spread out all over campus. For them, going back to a paper-based system would significantly slow processes. From faculty members with Ph.D.s to entry-level administrative staff with GEDs, different staff members have varying duties and responsibilities besides graduate admissions -- everything from timetable to payroll to undergraduate record keeping to tracking of satisfactory progress. Many departments have limited or no technical support. They are comfortable being on the Web, and they need to see what the Graduate School Admissions Office is doing and what other departments are doing with an applicant.

User-Centered Approach

Fortunately Graduate School staff and academic departments had worked together in previous years to develop earlier systems. The Graduate School assigned an administrative staff member as the team leader to assemble a cross-functional team that included three Graduate School admissions personnel, four people from academic departments, and three software engineers (two from the Graduate School and one from the central computing unit).

During brainstorming sessions with the internal and external users, we identified several significant problems with the vendor-supplied system that would cause considerable delay in our admissions process. First, data entry and data viewing were spread over many menus and screens: Address and e-mail were on one screen, previous institutions on another, GRE and TOEFL scores on another, and so on. Therefore users had to execute a series of time-consuming steps of navigation to enter or retrieve information through various menus and screens. Second, there was no way to upload data from our existing Web-based online admissions application to the vendor-supplied system. We needed a solution that would let us continue to upload the data directly to the central system without re-keying. Third, the vendor-supplied system did not a have good way to track who entered which decision codes on which applicants. In addition, there was no way to add links to other admissions-related information on the Web. The e-mail address on the panel was not hyperlinked. A user who wanted to e-mail an applicant had to cut and paste the e-mail address from the panel to the user's e-mail program. Lastly, there was no easy way to generate for each academic program a sortable list of applicants and relevant information about them, so users could enter evaluation requests and decision codes one after another. In large academic departments with several hundred of applicants, users could not afford to go through a half of dozen menus and screens for each applicant to get the information they need and to enter evaluation requests and decision codes.

Although it was possible to customized screens to fill some of these gaps, such screens would have to be analyzed each time the vendor upgraded or even patched the system. In most cases, each screen would have to be reprogrammed entirely or partially. We needed a solution that allowed us to minimize the impact and work we needed to do when an upgrade or a patch occurred.

As a result of the brainstorming sessions, internal users, external users, and software engineers listed all gaps and decided which gaps must be filled in order to carry out the University's research and educational missions. We decided three modules were critical to the admissions success: 1) Data-Upload module, 2) Scanner-Aided Data-Entry module, and 3) Graduate Web Information System (GWIS) module.

Data-Upload Module

The first module is the Data-Upload module. Since there was no way to upload data from the Web-based online admissions application to the vendor-supplied system, we developed a solution. Even after an upgrade or a patch, the upload requires minimal or no modification. The upload module works not only for applications received on the Web, but also for paper applications entered via the scanner-aided data-entry module. Because it uses the same vendor-supplied programming functions that the vendor's data entry screens use, this upload module fills all fields in the central system properly.

Scanner-Aided Data-Entry Module

The second module is scanner-aided data-entry system to speed up the data-entry process of paper application forms. The scanner-aided system uses a high-speed scanner to capture the images of the application forms and displays them on the screen. Data-entry clerks do not have to look back and forth between paper and screen. The objectives are to increase performance with minimal physical and cognitive workload and to increase accuracy with built-in lookup and error checking functions. Several features were determined during the initial brainstorming sessions and sequent iterations in the design phase to speed up the data entry process. Data-entry clerks enter only the necessary information assisted with intelligent defaults, auto fill, and auto completion. Additional features included the following:

- Auto flow and Auto track
- Elimination of code use
- Partial search from anywhere
- No mouse needed

The result was improved data entry for our internal users (Graduate School Admissions staff). Empirical comparisons showed that that the time to enter an application was reduced from 6 minutes 40 seconds (vendor-supplied system) to 2 minute 20 second (scanner-aided module). This saved more than 900 labor hours per year, so that the Graduate School no longer needs to hire seasonal staff for data entry.

Graduate Web Information System (GWIS) Module

The third module is a Web-based interface for the Graduate School and the academic departments to retrieve applicant information and to enter evaluation requests and decision codes quickly and easily.

Because of the political climate, which discouraged customizations to the vendor-supplied system, and because the Web would allow us to present all necessary functions on screens everyone could learn to use in 15 minutes, we decided to build a Web application to allow the Graduate School Admissions staff and academic departmental staff to track and update the progress of an applicant. To develop this module, we worked with a cross section of external users. The group included new employees with a fresh viewpoint, users who were familiar with the old mainframe transactions, and departments with special needs. We had four representatives on the team that met throughout the process. Later we convened a focus group with an additional 12 representatives. Still later we invited all academic departmental staff to open houses, and we used feedback from these to refine the module. We let them know how much we valued their input by showing them quickly how what they wanted would work. We asked them to think about an ideal system, no matter how they were used to doing things in the past. As we refined the system we brought new functions to their desks, as they responded we refined the system further.

We first developed a single screen that listed each department's applicants with relevant data about each applicant. Departments could immediately sort these lists by name, ID, domestic or international, or latest decision code. In addition, we developed the data sheet. Clicking an applicant's name on the list brought up a data sheet suitable for printing for the faculty admissions committee. Relevant information about an applicant was displayed on one screen, compared with half of dozen screens in the vendor-supplied system. The e-mail link on the data sheet was hyperlinked. Departments could immediately use this system from standard Web browsers with minimal training. They could print the page for review by faculty committees.

At first, academic departmental staff had to print the list, mark evaluation requests, and decision codes on it, and send this paper list to the Graduate School. Some months later, they could enter evaluation requests and decision codes on the Web. When this was done, communication between the Graduate School Admissions staff and departmental staff took under one day instead of more than two days (time it took for paper to be sent via campus mail). The system totally eliminated the need for paper. The system was simple enough to use that academic departmental staff now teach each other. Printing, data entry, linking, and so on work like everything on the Web.

We treat the system as a 'work in progress' to encourage the academic departmental staff to think about how it works, and how to improve it. In this way we improve the product continuously and the internal users, external users, and software engineers have a sense of ownership.

Conclusions

In the process of writing these independent applications to supplement PeopleSoft functionality on our campus, we were reminded that an iterative, user-centered approach is essential for its success. All too often programmers and those who use their programs end up in adversarial relationships. With GWIS, we develop a healthy working relationship, which continue to produce far better products. Also it makes work fun for internal and external users, and software engineers. The presentation will be relevant to all who are involved in implementing vendor-supplied information systems on their campuses and who want to ensure that their customers have the tools to make these systems truly useful.

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0040

Title: Administrative Systems as Instantiations of University Policy

Author: Mark C. Sheehan and H. David Todd

Organization: Montana State University-Bozeman and University of San Diego

Year: 2000

Abstract: Montana State University used the implementation of a new administrative information system as its opportunity to integrate an independent, four-campus administrative structure into a single environment, as had been mandated by its Board of Regents five years earlier. The additional stress generated by implementing new policy concurrent with implementing a new system appears to be a common complication for CIOs and policy makers. This session described how MSU dealt successfully with this in an 18-month implementation. (David Todd's contribution is a result of his former position at Montana State University.)

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0044

Title: E-Commerce@MIT

Author: Robert V. Ferrara and Lorraine Rappaport

Organization: MIT

Year: 2000

Abstract: MIT is integrating an array of e-commerce solutions into its business processes. Beginning with procurement through preferred vendor partners, MIT customers can now use authenticated Web access to purchase lab and office supplies and computers. MIT has deployed an MIT procurement card and is now working on electronic processing of credit-card transactions. This presentation will demonstrate the system and offer lessons learned for colleges and universities that may be preparing to implement e-commerce solutions.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0013
Title:	Higher Education ERP: Lessons Learned
Author:	Dave Swartz and Ken Orgill
Organization:	George Washington University and West Virginia University
Year:	2000
Abstract:	Universities are now spending in excess of $20 million each to implement modern Enterprise Resource Planning (ERP) projects that can take two, three or more years to implement. The early report cards are coming in from across the country in regard to ERP projects in Higher Education and the results are mixed. The two authors of this report, both CIO's of large universities, share their experiences and lessons learned on ERP and provide a framework to approach an ERP that could save your university millions of dollars.

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Higher Education ERP: Lessons Learned

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West Virginia University
Morgantown, WV

ABSTRACT

Universities are now spending in excess of $20 million each to implement modern Enterprise Resource Planning (ERP) projects that can take two, three or more years to implement. The early report cards are coming in from across the country in regard to ERP projects in Higher Education and the results are mixed. The two authors of this report, both CIO's of large universities, share their experiences and lessons learned on ERP and provide a framework to approach an ERP that could save your university millions of dollars.

Introduction

Universities are now spending in excess of $20 million each to implement modern Enterprise Resource Planning (ERP) projects that can take two, three or more years to implement. The early report cards are coming in from across the country in regard to ERP projects in Higher Education and the results are mixed. The two authors of this report, both CIO's of large universities, share their experiences and lessons learned on ERP and provide a framework to approach an ERP that could save your university millions of dollars. The issues covered include the development of a solid foundation for ERP such as a clear definition of requirements, a comprehensive project plan, a strong project team, back-filling the organization, and the commitment of leadership. Also discussed is the importance of the contract with vendors, including options of fixed cost versus time and materials approaches. The expected costs and benefits of ERP are discussed. Key challenges are identified for the success of the functional and technical project teams. Finally, the future of ERP is explored.

What is ERP?

The term "Enterprise Resource Planning" was coined in the early 1990s. ERP is a software solution that integrates information and business processes to enable information entered once into the system to be shared throughout an organization. While ERP had its origins in manufacturing and production planning systems, the scope of ERP offerings expanded in the mid-1990s to include other "back-office" functions such as order management, financial management, asset management and human resources management. The range of functionality of ERP systems has further expanded in recent years to include more applications, such as grants management, marketing automation, electronic commerce, student systems and supply chain systems. Common examples of ERP systems available include Oracle, SCT Banner, PeopleSoft, and SAP.

What are the Benefits of ERP?

There are many reasons to start down the ERP path. One of the main advantages to ERP is to improve access to information. With some legacy systems it is challenging to develop reports or to tap into transaction data stored on the computer. Modern ERP systems often improve upon this process and provide a strong foundation for moving to a data warehouse that can provide even more capability to extract data from administrative information systems.

Another reason to consider ERP is to improve workflow and efficiency. As an example, online requisitions can be completed and workflow processes can forward the form along the approval path more rapidly than with traditional paper processes. Another reason to consider ERP is the ability to improve controls and to program alerts. Alerts, for example, can be programmed to warn budget managers about budgets that are in danger of running out of funds and to implement controls that prevent individuals from overspending budgets.

One of the exciting developments in modern ERP systems is the availability of easy-to-use Web interfaces. These interfaces incorporate integrated portals that provide one-stop shopping for a wide range of administrative functionality and information. The ERP project often results in significant process reengineering and can breath new live into ineffective and inefficient departments. The ERP also creates the foundation for new business processes such as e-procurement that can provide significant returns on investment. Finally, one additional benefit we have observed from the ERP process is that the individuals that have been involved with the project often bring away from it a new work ethic that helps to spread to the surrounding work place.

First Steps to ERP: Well Begun is Half Done!

The planning and preparation process of an ERP project often consumes a significant portion of time. A woodcutter will often spend one-third of his time sharpening the axe before he starts chopping wood. Likewise, the time spent in preparation for the ERP makes the job go more smoothly and quickly. One of the first steps is to evaluate the needs and requirements that will drive the implementation of an ERP. A detailed needs assessment and a definition of requirements are essential not only to guide the start of the project, but also to gauge the success of the project after completion. You should ask yourself, "What do you want your business to become?"

The next step is to review the different solutions available and see which system can best fit your requirements. As part of the fit analysis, detailed accounting of gaps may be developed. An evaluation will need to be conducted that compares the trade-off of the various solutions. Some solutions are more flexible and can accommodate a wider range of different best-practice models. Other systems have less flexibility and will require custom modifications to make changes. The added costs of modifications should be factored into the decision process.

Another issue to consider is best-of-breed versus integrated solutions. ERP solutions today often have their spearhead application. Some ERPs are better at finance, others are better at human resource, and still others may be better at student applications. One option is to integrate best-of-breed from different vendors and another is to pursue an integrated solution. While an integrated solution may not provide the best available solution in all cases, the advantages of an integrated solution may outweigh the benefits of best of breed. Integrated solutions often leverage the advantages of having an integrated store of data. The challenge in this rapidly changing environment for ERP, where new releases are often, is to ensure that the different systems work well together.

Over time, the differences between systems are becoming less pronounced, so that integrated solutions are becoming available from multiple vendors. Also, don't underestimate the timesaving involved in dealing with only one vendor and the burden of maintaining relations and communications with multiple companies.

Lastly, your ERP implementation plan must consider whether to follow a phased implementation rather than attempt the big bang approach. A phased implementation is usually the wisest and most cautious course but takes longer and can incur higher consulting costs. At WVU the big bang approach was utilized primarily because of Y2K deadlines and the additional cost that would result from incorporating temporary stubs and drivers to bring modules up individually.

Do Not Underestimate the Costs of ERP

It is important to get an accurate and complete picture of the projected costs of an ERP. Many of the direct costs of ERP are obvious and are often budgeted and accounted for directly by project planners. However, these costs do not represent the total picture of what an ERP will cost your institution. It is important to not underestimate the total cost lest you nickel and dime your leadership over the course of the project. The direct costs include the costs of the software applications and tools. These applications are often licensed by the number of users, so be sure to project anticipated growth based upon new Web-based applications, not the installed base of legacy systems that may have restricted access to users.

The next area to consider is the underlying database management system. There is little competition at present in this product space, though some ERP vendors are making significant efforts to integrate with more than one database vendor.

Our experience with the hardware environment is that you will probably need much more hardware then you had anticipated. On one of our ERP projects we doubled the amount of disk an "expert" consultant told us we would need, and we still ended up using every bit of this extra disk and then some. The hardware components budgeted should include the central servers (CPU, disk, network equipment) and don't forget the need to upgrade PCs to a designated minimal configuration.

Probably the largest area of costs will accrue from personnel – project staff, back-filled staff, consultants, recruiters, project managers, and raises. Don't forget the need and costs for training and mentoring. Contracts with consultants often leave out the important area of knowledge transfer – be sure to put this in your contract with consultants. While you may remember to budget for the main consultants to assist you with the project don't forget consultants that you will bring in to conduct a risk assessment and audit of the project at mid-stream and prior to cutover.

Another cost consideration to be considered before the project is initiated is the cost of ongoing maintenance and future upgrades. ERP upgrades are not cheap and can involve considerable expense and effort. Make sure your executive leadership knows what they are committing to long term, not just the cost of the initial implementation.

Contract for an ERP

Many institutions will embark onto an ERP with the assistance of one main vendor. This prime contractor will often sub-contract out other work and services when needed. There is a real advantage to having just one butt to kick. Anyone that has attempted to build his own house and act as their own contractor can attest to the risks of doing it alone, since it is difficult to obtain expert assistance if you do not have depth of resources to draw from. Millions of dollars are on the line so it is best to leave this area to the experts.

If you decide to retain a prime contractor for ERP then the contract is critically important to your success. Take it very seriously. We inherited one contract developed without the needed expertise and review. We suffered for it, so heed our warning. Develop a precise contract with both legal and ERP expert review. Should you attempt to negotiate a fixed -cost or a time-and-materials contract? We have done both forms of contracts and the fixed cost approach has some advantages, but the language of the contract will need very careful wording since vendors will look for loopholes to reduce their costs. On the other hand, a time-and-materials contract should have clear milestones and performance benchmarks to insure best use of your resources.

It is suggested that in your contract you allow for changing technology during the course of your project. ERP projects can often last for an extended period of time and new functionality or ERP modules may become available that were not included in the contract. Keep the door open to new functionality. Finally, be skeptical of vendor promises. Get it in writing!

Limit Customizations and Scope

One of the biggest problems in ERP implementations is when the institution attempts to customize the new system to fit every existing business practice. Most state-of-the-art ERPs are based on best and current business practices. Many institutional business practices have evolved over many years and are outdated and arcane. When faced with a choice many institutions choose to adapt the new system to the old business practices because "we've always done it that way". The resulting modifications add a huge cost to the project and perpetuate an outdated way of doing business. The opportunity should be taken to reevaluate business practices and workflow processes, possibly incorporating those suggested by the new ERP. This isn't an easy or quick task and is fraught with political peril, but what other better opportunity will the institution have to accomplish this important review?

In addition to the danger of a multitude of customizations, be careful to clearly delineate and effectively limit the scope of your project. "Scope creep" can be a major problem in any poorly managed project but can be especially rampant in an ERP project. Your contract will help you manage this problem if it is precise and detailed, but especially in a time-and-materials contract the vendor will be more than happy to add additional functionality for a price. As the project progresses members of the campus community will see "critical" functionality that needs to be added and will lobby hard for additions to the original scope. While new functionality should not be rejected out of hand, hard decisions must be made to keep the project from careening out of proportion. Even worse is the scenario where customizations quietly happen behind the scenes and without the knowledge of the project manager. Care must be taken at all stages of the project to contain scope creep.

Use of Consultants

Most large-scale ERP projects will employ consultants. Consultants can play many different roles on your ERP project. Consultants can help staff the project team, help to back-fill positions, be charged with responsibility for project management, audit the project, serve as the prime contractor, and be the one source for everything from software to hardware and personnel for the ERP. You need to select the proper balance between university and outside people on the ERP project. Too many outside people and not enough university people may make it difficult to transfer the knowledge of the new ERP and also provide much needed information on legacy operations and procedures. It may be a good idea to open up channels to more then one group of consultants, since it will reduce the leverage they may have and also provide a greater range of resources to use if needed. At one of our institutions it was found that a cost effective method was to employ "Big Five" equivalent consulting (at much higher hourly rates) for tasks that required intimate product knowledge while using cheaper "local" talent for more run-of-the-mill programming and other tasks. Check with other universities prior to hiring consultants to make sure they performed well on similar ERP projects at other universities. Also, plan the exit strategy for consultants, since they are expensive and the monthly run rate makes it critical that projects do not run over.

Lastly, make sure your contract includes a clause that gives you "right of refusal" over any individual that does not perform to your expectations. Generally speaking, you should have at least a week - preferably two - to send back any consultant that isn't right for the task that has been assigned. Also, watch carefully for consultants who have been oversold by their company and in reality are relatively inexperienced. It's an expensive proposition if they learn at your expense. While consultants need to gain experience somewhere, you shouldn't have to pay full price when you are effectively training them.

Project Management

Without question, one of the most important decisions to be made on an ERP project concerns the selection of a project manager. The project manager is the general that will lead the troops into battle. This person needs to be a leader and have the respect of the troops and university administration. It is better if they are an insider and have loyalty to the university. But, it is also necessary that an experienced project manager be selected – a professional. If your logical choice for project manager is a person who has superior knowledge of the functional area, but no formal project training or experience, be very careful. We found the ability to efficiently and effectively run a large project to be the single most important attribute of this key individual, far outweighing any other factor. If experience is not available, at a minimum make sure you send your designee to formal project management training. The next suggestion is that a standard project methodology be adopted that provides some guidance and structure to the project. Next, it is necessary to select a manager for the functional side and also one for the technical side of the project. Individual teams, such as the grants management team, needs to have a lead identified. The project manager needs to report on a weekly basis to a group of executive sponsors, generally composed of the Functional VPs (e.g., CFO) and CIO. A larger group, that comprises an Executive Steering Committee, will provide periodic strategic guidance and support to the project. Some schools have additional advisory committees, such as process owners, who provide focused input from users. However, be careful, that broad based consensus decision making does not generally work well on ERP projects. The project team should be located in a shared location that enables groups to interact and work together away from the day to day concerns of the functional units.

Creating the "Single Team" Atmosphere

A typical ERP project involves personnel from a number of departments within the institution as well as a sometimes major injection of consultants. A primary reason for less than successful ERP implementations is the inability of this disparate group to come together in a focused team-oriented manner. All too often the team membership polarizes into "us versus them" factions (functional vs. technical, everybody vs. the contractor, etc.) and the project degenerates into a mass of finger pointing. A successful ERP project will require that the functional and technical leadership and teams develop a strong partnership and a shared commitment to the success of the ERP. The partnership at the top provides the foundation that needs to be created. Without this joint commitment to work together don't even attempt an ERP project. Furthermore, if there is a major consultant presence on the project, key partnerships at every level will be required to maintain the cohesiveness of the team. When possible, consultants should be incorporated directly into the team. This requires a major trust factor on the part of the institution but is important.

Key Functional Issues and Challenges

The ERP Functional Team will encounter some significant challenges not touched on previously that should be anticipated early on in your project. We cover them briefly below.

- Process engineering – Change in current business processes are often needed and recommended as a result of an ERP; you don't just want to pave cowpaths!

- Back-filling staff – Do not assume that it is possible for someone to do everything they did before the ERP started and also serve as an important agent on the ERP project. Be realistic about needs both on the project and back in the functional unit during ERP.

- Training – Give some serious consideration to the type and timing of training. The traditional form of training where a person goes for days at a time and does not interact with the system for months does not work.

- Recruiting and retaining staff – Once you train people on an ERP they become much more marketable and you will need to consider the difficulty you will encounter in retaining and recruiting key personnel. Therefore, get started early.

- CRP – Give serious attention to the CRP (conference room pilot); it is more than just window shopping.

- Reporting – Will routine reports be printed to the Web? Will users give up their paper easily? The ERP will often enable easier development of ad hoc reports. You will need to set priorities, since it will be difficult to meet the broad demand for reports on the first day of production.

- Addressing gaps – There will be gaps between what you perceive is needed and what different ERP solutions can provide. You will need to make some compromises or get your wallet out to support modifications to the system

- Setting expectations – Don't make the mistake of raising expectations too high in order to obtain the funds needed for ERP. Be more modest in the expectations you set and then exceed them.

- Obtaining user buy in – It is nice to obtain user buy in, but don't think you will obtain a universal consensus; this is a university we are talking about.

- Validation of data and systems – You will need to plan a mid-course risk assessment and a pre-production audit before you go live to verify your testing of the system and final production set ups.

- Communications – Get the word out often and in different forms.

Key Technical Issues and Challenges

The ERP Technical Team will encounter some significant challenges not touched on previously that should be anticipated early on in your project. We cover them briefly below.

- Holding the line on modifications – The Technical Team needs to work closely with the Functional Team to hold the line on modifications, since they will inherit the system and have to maintain the mods. When computing the cost-benefit do not forget the discounted cost of maintaining the mod into the future through a rapid stream of upgrades that can be anticipated in the years to come.

- Recruiting the talent needed and holding onto them – Personnel issues will hit the Technical Team as well, especially the difficulty in recruiting apps DBAs.

- How much hardware is enough? – Do not underconfigure your system. It can be a nightmare to spend many months designing and building a system, just to have it perform slowly out of the gate. Remember not only to do functional testing, but also performance and load testing of the system.

- Conversion of data – Do not underestimate the challenge of converting years of legacy data into a new format needed for the ERP. A better approach may to be to ship the legacy data to an archive or data mart and then start the new system fresh or with little converted legacy data.

- Interfaces – Who is going to maintain interfaces in the new ERP environment? Who is responsible for checking the data prior to it being shipped to the ERP? The new model of operations will most likely not conform to your previous approach.

- Change management and problem tracking – Adopt a formalized process and system for logging change requests and any problems encountered with the system during the development as well as production phases. At some point shortly after CRP you need to put a freeze on change. However, get ready for objections from the functional side.

- The minimum desktop requirements – Some ERP systems may require many of your existing legacy PCs to be upgraded. Some ERP clients do not support MACs. Be sure to factor in the desktop issue and make some early decisions and announcements on who is responsible for upgrading systems.

- Distributed vs. Centralized production – There are various modes of production from a distributed model to a highly centralized model. ERP systems can support a distributed model that places more control and responsibility into the hands of the functional units. But, they will need the same types of controls and procedures to guide their efforts, which are akin to the run books of centralized production environments.

Personnel Recruitment and Retention Issues

Probably one of the greatest challenges to be encountered these days on an ERP has to do with recruitment and retention of key personnel. Additional issues to consider are listed below.

- Additional compensation for "Life of Project" efforts – Announce a bonus program to help keep key personnel on throughout the project and help drive key objectives such as CRP. Then deliver on your promises.

- Find and nurture people early – Get started early in identifying and recruiting key personnel needs. You may have to grow your own specialists, so identify people you can count on sticking with you throughout the project and after you go live. Invest in these people, but realize you will lose some of them during and after the project. This is where a partnership with one of the large consulting groups is valuable since they can provide some depth of resources when needed. But, even these companies are having some difficulty these days, so you may want to line up a few sources.

- Back-filling staff – Make sure you have enough depth on the operational side, since it can really take the steam out of a project to lose key functional staff as they are pulled off the project to support day to day functional operations.

- Staffing matrix – Set goals for staffing and then track progress.

- Knowledge transfer and mentoring – Develop a plan to transfer knowledge from consultants to key university personnel.

- Stress management – The pressures of an ERP project can build up enormous levels of stress in everyone. It is good to give some attention to managing stress levels through various means and keep an eye out for the employee on the edge, since it can cause a ripple effect throughout the project.

- Team building – Early on in the project focus some energy at building teams that can work together even when the going gets difficult.

Morale of the Team

ERP implementations are hard on institutional personnel. The extreme perseverance and dedication required over a long period of time take its toll. Caution must be taken to provide periodic "downtimes" and events to boost and maintain moral. During our projects we periodically provided occasional dinners and lunches, held brief cake and punch parties to celebrate the achievement of important milestones, had barbecues in the parking lot, and other activities. These events also gave us the opportunity to recognize outstanding contributions to the project. After completion of the project more major events were undertaken to recognize team efforts and reward contributions.

The Future of ERP

The ERP space in higher education is moving rapidly. Vendors that have not spent much time understanding the needs of higher education are doing much better now than previously, though they can still do much better. As a result of the growing competition, vendors are working at rolling out integrated suites of software that support the thin client Web interface and object oriented systems. New versions are now rolling out much faster, making it challenging to keep up with the ERP project that never seems to end. As soon as you are done with the implementation, you are working on the next major upgrade.

User Groups are growing in their importance since they can help to drive vendors to become more sensitive of the needs of higher education. They can also provide important forums for schools to share information. ERP systems are rapidly beginning to embrace the demands forthcoming for e-commerce applications such as online billing and payment, e-procurement, etc. The data warehouse and data retrieval tools are maturing and will play a more important role in the future.

Sooner or later higher education will wake up to the fact that not every university is that much different. There are some best-practice models that should be provided by ERP vendors in order to reduce the cost of ERP implementation. Some of the ERP vendors are doing this for smaller schools, but what about the more complex R1 institutions? Finally, as universities can move toward some best-practice models, the possibility of ASP becomes more attractive and economical.

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Year:	2000
Abstract:	Wise technology decisions are continually needed to support rapidly changing campus environments. Learn how seven diverse Florida Community Colleges combine fiscal and human resources, producing campuses with more advanced, better-managed technology. Specialized design teams combine end-user architects with technical experts to propel the colleges forward to support eApplications.

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INTERNAL OUTSOURCING:
LEVERAGE RESOURCES AND MAINTAIN CONTROL

By Carlotta Appleman, Tallahassee Community College
and
Chuck Zettler, Palm Beach Community College

Representing the
FLORIDA COMMUNITY COLLEGE SOFTWARE CONSORTIUM

ABSTRACT

Wise technology decisions are continually needed to support rapidly changing campus environments. Learn how seven diverse Florida Community Colleges combine fiscal and human resources, producing campuses with more advanced, better-managed technology.

Specialized design teams combine end user architects with technical experts to propel the colleges forward to support eApplications.

INTERNAL OUTSOURCING:

LEVERAGE RESOURCES
AND
MAINTAIN CONTROL

FLORIDA COMMUNITY COLLEGE SOFTWARE CONSORTIUM

I. INTRODUCTION

A. ISSUES

All institutions of higher education must face and solve problems associated with the increased need for ever-changing technology. This is an ongoing issue, which began to accelerate several decades ago. Examples that must be addressed are: hardware and software selection, the hiring and training of staff, and the finances needed for all of the above. Those decisions have lead institutions to question and/or evaluate the following directions: developing in-house applications, purchasing application software and outsourcing to an application service provider (ASP). Each direction has its positive and negative aspects.

- Develop In-house Applications

Definitely as a positive, this direction provides control of content, timelines, and priorities. The In-House development is tailored to what the institution needs and wants.

Depending on the existing resources of the institution, the need for I/T management and technical staff, hardware, software development and training for technical staff could be considered a negative aspect.

- Purchase Application Software

It is positive to purchase software, not requiring the institution to have the I/T management and technical staff to design, develop and maintain software.

The limitations of this approach include the use a system developed to some "out of the box" specifications. The institution must accept these specifications, pay for changes or have an I/T staff trained to make changes. One of the greatest limitations is less control over modifications and enhancements. These requests must be prioritized with other institutions' requests so there is definitely less control over content and development time.

- Outsource to an ASP

The plus of this option is the institution does not need an I/T Department, if the ASP supports hardware, system and application software. Whether the ASP helps in the purchase of software or develops software for the institution, the discussion above, relating to control of timelines and priorities, applies.

The main issues of this option are communication. If all I/T functions are outsourced, one or more staff at the institution must be knowledgeable, responsible and work directly with the ASP to assure they are following the direction desired by the institution.

B. BACKGROUND

The 1990's presented a variety of critical challenges to all institutions of higher education, including the twenty-eight Florida Community Colleges. Approximately six years ago in 1994, seven Florida Community Colleges were individually facing similar situations. Legislated mandates from both the State and Federal governments arrived with increasing frequency. At the same time, funding from both sources to implement these mandates shrunk or was non-existent. The demographics of the student population were changing dramatically. A decrease in the number of traditional students was offset by an increase in non-traditional students.

As a result, most Community Colleges have been forced to find even more cost-effective ways of doing business. In this rapidly changing and increasingly complex environment, we have come to rely on automated systems to support management decision-making and to provide improved student services.

In fact, not only were new systems required, but a new way of developing and maintaining systems was required for the colleges to meet state mandates, prepare for Y2K and meet the basic growth in services they predicted would be needed. Several factors made this so:

- Software systems were in place, stable, and functional, but were nearing the end of their life cycles. They were written in languages using design features that were out-of-date and required complex maintenance processes.
- Most of the applications did not fully meet mandated requirements.
- The time and cost to individually develop new systems was excessive.

Each of the seven colleges wanted new systems which would meet State, Federal and College requirements, but also systems written with tools that could be easily managed, changed and enhanced in the future. At first purchasing software sounded appealing, but existing packages that met all the Florida mandates and college requirements for students, finance and payroll/personnel could not be found. Each of the seven colleges already had competent staff and owned hardware; therefore, their top management did not seriously consider outsourcing the entire I/T function to an ASP.

What choices were left if individual development was too slow and costly for the "long term", applicable packages for most systems did not exist, and outsourcing management and development to an ASP seemed too dramatic an approach at the time? The 1994 Florida Legislature stimulated the thought process by appropriating seed money for the development of integrated student, personnel, and financial databases, with emphasis and rewards for sharing development activities. An idea formed in the minds of several of the colleges' top administrators. If the colleges worked together and pooled resources, they could develop new software together.

C. CONSORTIUM FORMATION

With the appealing concepts of outsourcing, being able to control the design, development tools and priorities and then being encouraged to share by the Florida Legislature, the Presidents and top administrators of the seven Community Colleges decided to form the Florida Community College Software Consortium (FCCSC) and to work collaboratively to initially develop four mission critical applications: finance, student, personnel/payroll and facilities. The top administrators liked the idea of outsourcing to themselves. That is, they liked internal outsourcing, to share resources but maintain control.

II. CONSORTIUM APPROACH

A. LOGISTICS

The participating community colleges are Broward CC, with 24,720 students; Florida CC at Jacksonville, with 19,645 students; Indian River CC, with 12,589 students; Miami-Dade CC, with 47,152 students; Oskaloosa-Walton CC, with 6,730 students; Palm Beach CC, with 16,962 students; and Tallahassee CC, with 10,736 students (October 1999 Headcount). Together, the full-time equivalent (FTE) of these seven community colleges represents about 47% of the FTE of the students of the 28 Florida community colleges. The logistics of the Consortium are difficult as the distance between the colleges varies, i.e. Oskaloosa-Walton CC to Miami-Dade CC is about 609 miles while Miami-Dade to Broward CC is about 22 miles. The fact that colleges, so very different in size and located geographically far apart, voluntarily choose to work together on such a large project is in and of itself significant.

Currently the Consortium has an office for its staff, training and meetings, which is located in Ft. Lauderdale. Development of application software occurs on hardware provided by Miami-Dade Community College. Each of the member colleges transfers (ports) software releases to its own college environments for production.

B. MISSION

The mission of the FCCSC is to develop, implement, maintain and enhance world-class software and other automated processes for the Florida Community College environment. The FCCSC provides leadership working with community college staff in the definition and prioritization of the business processes to be automated. It also coordinates the efforts of all consortium members in the development of new software enhancements and processes.

C. GOALS

The FCCSC develops, enhances and maintains a repository of high quality, good performing, and well-documented applications. FCCSC will continue a leadership role in supporting the evaluation, development and/or selection of applications needed by the colleges.

The repository offers to its members the best possible solution as they:

- Provide an alternative for satisfying application requirements in addition to buying or building individually.
- Increase productivity and efficiency in the development and maintenance of applications.
- Offer the latest "best practice" applications with more useful features.
- Reduce the cost in the development and maintenance of integrated applications.
- Enhance users' understanding of application functions and methods used by others.
- Provide a communication facility for matching needs and solutions.
- Provide a solution written in an advanced technology tool set.

D. OBJECTIVES AND STRATEGIC INTENT/PLAN

The success of FCCSC lies in its ability to maintain and expand its repository of applications that are "best practice" and are easily transferred to member colleges.

All Consortium decisions will take into consideration actions to support the following directions:

- To provide Web/IVR interfaces (Graphical User Interfaces (GUI) will be provided by Web interfaces) where the mainframe server program will use common message formats for application service requests, independent of where the request originated.
- To support an executive information system for institutional decision making and friendly end user reporting.
- To seek enterprise licensing for application and utility software used by the Consortium colleges.
- To maintain common platform and architecture for quality control.
- To assure software design will take into consideration both personnel and hardware resources.
- To define the hours of operation and support needed by the Colleges.
- To define the testing process needed for successful ongoing development and maintenance.

E. ADVANTAGES

The distinctive advantages that FCCSC brings to its members are:

- Experience. Applications that are accepted into the repository will be considered the "best practice" by function standards as well as "best technology standards."
- Sophistication. Applications will be integrated and of a high quality using cutting edge technology.
- Efficiency. The philosophy of FCCSC is that joint sharing will enable increased productivity in the delivery of proven applications.
- Regularly, through the committees, the members' needs and solutions will be assessed to determine repository candidates and priorities.

F. ORGANIZATION

The College Presidents

- Have ultimate authority for strategy, tactics and direction.
- Designate an Executive Committee Member to represent each College.

The Executive Committee

- Has overall authority as designated by the Presidents.
- Sets long-term priorities and directions.
- Has final approval for:
  - Allocation of funds.
  - Progress of overall project.
  - Resource allocation.
  - Changes to the project plan.
  - Contracts and Agreements.
- Identifies Technical Committee and User Group Members.
- Hires and Supervises the Consortium Executive Director.

The Technical Committee

- Reports to the Executive Committee.
- Has month-to-month authority.
- Responsible for technical oversight.
- Assures adequate resources on the projects.
- Are site managers of project resources.
- Supervises the Systems Environment Group.

The User Committees

- Are comprised of one primary member per system per college.
- Are the architects responsible for defining the business functions.
- Work with technical experts to design, test and prioritize enhancements.
- Are empowered by their colleges to obtain "best practice" solutions.
- Arrive at consensus with the "one vote per college" rule.
- Have meetings called and facilitated by the FCCSC Group Managers.

Systems Environment Group (SEG)

- Are technical college members, database managers and system programmers.
- Are responsible for:
  - System performance.
  - Data management.
  - Environment management.

  - Product support.
  - Version management.

Executive Director

- Reports progress and status to Executive and Technical Committees.
- Defines and adjusts project plan.
- Maintains project budget.
- Manages the projects.
- Hires and supervises Consortium staff including: group managers, programmers, systems programmer, quality assurance and database administrators
- Supervised by the Executive Committee.

FCCSC Help Desk

- Staffed by Consortium employee(s).
- Records all requests.
- Answers simple questions and refers all others to Consortium group managers.
- Is assisted by college help desk staffs, which are responsible for first line support.

Group Managers (GMS)

- Are Consortium staff.
- Are technical leaders specializing in at least one of the major systems.
- Coordinates all activity that affects the baseline software of the FCCSC.
- Manage the maintenance function for their systems or areas.
- Functional GMs manage applications and operational GMs manage the maintenance environment.

III. OUTCOMES

A. SUCCESSES

Between February 1995 and September 1999 the FCCSC designed, developed and implemented at the seven colleges the following integrated on-line real-time administrative systems.

- PERSONNEL including applicant tracking, demographics, job assignments, benefits, position accounting, payroll, time accounting and FTE accounting.
- FINANCE including general ledger, budget, accounts payable, credit and collections, and purchasing.
- STUDENT AFFAIRS including admissions, registration, records, curriculum, fees and tuition, and degree audit.
- FACILITIES including inventory and scheduling.

Also during its first five years of existence the FCCSC has designed, developed and implemented at all or most of the colleges additional systems, including the following:

- WEB including registration, course availability, grade checking, address changes, degree audit and financial aid tracking and status. Under development are fee payments and admissions.
- IVR (interactive voice technology) including registration, grade checking and fee payments.
- FINANCIAL AID – the Financial Aid Directors of the Consortium selected a financial aid system to purchase, which is written in the same language and supports the Federal, State and private grants, scholarships and loans needed by the colleges. The Consortium wrote the interfaces from this financial aid system to the finance and student systems.
- FACTS -- The State of Florida has a major initiative to support students called Florida Academic Counseling and Tracking for Students (FACTS). This is a statewide web-enabled system that allows all students and all potential students to review the programs of Florida's higher educational institutions, to access their place in a program, and eventually, to be admitted, receive financing, plan for and register for programs and courses. This system, via the web, provides real-time interaction among institutions and with any student or potential student. The FCCSC colleges worked together and with the FACTS organization to design, develop and implement the interfaces from the Consortium software to the FACTS system.

B. AREAS OF IMPROVEMENT

Always the number one area of improvement is in communication. With an organization this large, diverse and logistically separated, there is never enough communication. In May 2000, the Consortium held its first annual Users Conference. This was a time when all user teams met together to share in their successes and work together to establish the next year's goals. Recognizing successes is very important. It always seems much easier to notice problems and let successes occur quietly. The users and technical staff left this meeting with a better understanding of other groups and how all teams are important to the Consortium success.

It is also very important for top management to continue to make the time to be involved with user meetings. This most often occurs during major implementations, but it needs to occur on a continuing basis too.

In summary, it is truly amazing that all seven such diverse colleges continue to agree that we have chosen the correct direction and want to continue to work together. The willingness of the Executive and Technical committees to agree on issues and pull in the same direction is phenomenal.

C. FUTURE

What is the future for the Consortium and its member colleges? We certainly plan to continue to work together and share knowledge and efforts in the area of application software design and development. We do plan to continue to leverage our purchases and maintenance through enterprise license agreements. Currently, we are undertaking a study to see if there is a more cost effective way to develop and maintain our software. For example, would it be more cost effective for the Consortium to be a full-service ASP for the member colleges?

The FCCSC has sold the software to two universities/colleges out of the State of Florida and currently provides maintenance support for one. It is the intent of the Consortium to continue to make these types of decisions when they are in the best interest of the Consortium and the other university/college.

D. CONCLUSION

The FCCSC has already been very successful in the systems we have designed, developed and implemented. We will continue to be successful because along with the enthusiasm of the colleges and the need and desire for our products, this Consortium has three criteria required for success. They are:

- The Consortium must be organized and managed so success occurs. It is rewarded along the way because with ever-changing technology; the end is seldom reached. The annual users conference is an important means of giving this praise.
- The Consortium must have support and direct involvement of the users. Our users are the ARCHITECT.
- The Consortium must have top management support. Look at the commitment of the college resources, both personnel staff and financial to provide this support.

Our dynamics and momentum are strong! Every member college believes in our success!

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0055
Title:	It Takes a Village to Raise an Integrated System
Author:	Marianne Colgrove, Jennie L. McKee, and Nora McLaughlin
Organization:	Reed College
Year:	2000
Abstract:	This session will highlight Reed College's development of an integrated information gateway that is indifferent to the accidents of underlying technology and institutional organization. Focusing on the needs of faculty and students, departments within the college collaborated to build an integrated means of accessing diverse information resources, including library reference material, student information, and budgets.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0032

Title: Streamlining the Admissions Process with Imaging and Workflow

Author: Kathy Cross, Lavon R. Frazier, and Lynn Hulett

Organization: Washington State University

Year: 2000

Abstract: Document imaging and automated workflow technologies have completely transformed the admissions process at Washington State University. All application material is stored in imaged form, and admissions staff use automated workflow to process applications electronically. In this session, WSU shares the vast improvements in processing efficiency and customer service that they have achieved and their ideas for future enhancements.

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Streamlining the Admissions Process with Imaging and Workflow

Kathy Cross
Lavon R. Frazier
Lynn Hulett

Washington State University
Pullman, Washington

Document imaging and automated workflow technologies have completely transformed the admissions process at Washington State University. All application material is stored in imaged form, and admissions staff use automated workflow to process applications electronically. In this session, WSU shares the vast improvements in processing efficiency and customer service that they have achieved and their ideas for future enhancements.

Introduction

Washington State University (WSU) is a Research I land-grant institution. Founded in Pullman in 1890, WSU is Washington's only statewide university with three branch campuses, 11 regional learning centers, and an extensive distance education program. WSU serves more than 21,000 students, including approximately 3,000 graduate students. The university consists of 10 colleges and a graduate school. For more than a century, WSU has offered strong and varied academic programs. The liberal arts and sciences occupy an important place in the curriculum, along with business, education, architecture, pharmacy, nursing and the traditional land-grant programs in agriculture and home economics, engineering and veterinary medicine. WSU was ranked again this year in the top ten wired public universities by Yahoo Internet Life magazine. This ranking is partially based on the excellent backbone network in place on our main campus and the educational network throughout the state. This technology was critical to the success of the university-wide implementation of an imaging and workflow system.

The Business Problem

Before the imaging and workflow project began, WSU's admission processing was based on paper application materials kept in each student's file folder and data kept in the mainframe student information system. Multiple staff members in Admissions and other offices needed to see the documents in the folders to do their work, and these pieces of paper could only be shared by making copies or passing the folder from desk to desk. Admissions Office file cabinets were burgeoning with folders and taking up valuable floor space. Loose documents and file folders were piled high on staff members' desks. Frantic emails were sent many times a day to the entire office to try to locate "missing" files, transcripts or applications. Admissions Office staff answering questions from students and parents on the telephone and at the front desk effectively removed a student's file from the processing flow when they retrieved it for information. Staff members from other offices, such as Athletics and the Student Advising and Learning Center, prowled from desk to desk in search of files for students they were trying to process. Copies of every transcript and transfer credit report were routinely made and sent to academic advisors via the campus mail system. We desperately needed a way out of the paper pandemonium!

WSU's desire to enhance enrollment was also a major consideration in the initiation of the project. By becoming more efficient and reducing the time necessary to process applications, WSU hoped to increase its success in national and regional competition for high quality students. Enrollment statistics show that the quicker applications are processed and students are offered admission, the more likely they are to enroll. University enrollment enhancement initiatives were expected to increase the number of applications submitted into the process, and the existing model simply did not have the capacity to handle them efficiently.

These business needs pointed to a paperless, shared admissions process to improve efficiency, expand capacity and enhance customer service. The solution explored and then implemented was a university-wide electronic document management system with automated workflow. The Admissions Office was selected for the initial implementation of the new system, including document archive and retrieval functionality and automated workflow processing, with plans to extend it to meet similar needs of other university offices over time.

System Selection and Implementation

In the spring of 1998, WSU undertook the search for a solution to its document management needs. After an ambitious product and vendor evaluation effort, a selection was made that fall. The eMedia product (now renamed Acorde) from Optika Imaging Systems was selected, together with a third-party integrator, Integra Information Technologies.

Process analysis and design began immediately. Modeling of the manual file management system in the Admissions Office revealed a confusing mix of procedures within the office and at the branch campuses. Because of the tight schedule for system implementation in the admission application and enrollment business cycle, there was no time for reengineering, and the existing business rules and processes were programmed into the electronic workflow. Servers and a scanner were ordered, workstations and network connections were upgraded, software was installed, and staff members were trained. Optika's newly released imaging and workflow software along with Integra's custom scanning and indexing modules were implemented in the Admissions Office in January 1999, just after the start of the Fall 1999 processing cycle. This aggressive timeline, change in processing methods, and implementation of the new system precipitated many adjustments in the Admissions Office and transformed the processing of admission applications.

Results of the Transformation

Application forms, checks, transcripts, and other paper documents that arrive in the mail are sorted and scanned into the system daily. As soon as a set of documents has been scanned and image quality is approved, a staff member uses customized software that interfaces with WSU's student information system to assign indexes to each scanned document. These indexes include the applicant's student number, name, campus, and other identifying information so that the document image can be easily retrieved. Images submitted to the system are immediately available for offices across the university to view or annotate. This has provided an enormous customer service benefit. A staff member taking a call from a student or parent is able to use a query tool to see a list of documents received for the student in question without having to search for a file folder that might be anywhere in the office.

Electronic workflow has renovated the way applications are processed. In the old paradigm, an application form was held until the application fee was paid and all required supporting documents were received and manually added to the file folder. With the new system, a workflow package, or virtual file folder, is created upon receipt and scanning of an application. When the application is scanned, the index data from the student information system is also used to populate the workflow database. Workflow rules then automatically route the package to a holding queue until all necessary transcripts, etc. have arrived. Document type is captured during the scanning step, and any type other than "application" triggers review of the package. When an application package is complete, workflow rules route it to the appropriate electronic queue for review and action. A staff member selects a package from the system by using a predefined profile, or filter, based on package characteristics such as status, campus, or queue. He/she "locks" the selected package into his/her electronic in-box before starting to work on it, guaranteeing that only one person is working on a package at a time, although multiple people can be working from the same queue. After his/her work on the package is complete, then a click of a button sends it back to the workflow process where it is evaluated by the automated rules and sent on to the next queue.

This automated workflow has had a huge impact on the Admissions Office. Staff members no longer need to pass file folders from desk to desk. Packages can be located by anyone using the software; journal entries and comments can be reviewed; package history reveals exactly what processing steps have been completed. Other offices involved in the admissions process, such as the Student Advising and Learning Center, are included in the workflow and no longer need to come to the Admissions Office to retrieve files.

The use of profiles has had benefits other than allocating work among the staff. Because most admission processing for the branch campuses is done locally (transcript evaluation being the exception), manual procedures were difficult to standardize. Use of profiles allows the automated process and a single set of rules to drive procedures and events at all campuses. Also, when management decides to give priority to processing applications in a particular status, profiles enable quick set up of queries to find them, instead of researching and locating individual files.

Seven custom forms and a workflow database were developed to display and hold all data necessary to process a student's application. Each of the forms is designed to address the needs of staff members during a particular step of the processing. For example, one form holds information for answering status questions on the telephone, one contains transcript evaluation items, and one includes items pertinent to international students. Several of the forms contain free-form fields where comments can be entered, effectively replacing the yellow sticky notes that used to dot the file folders and documents. A recently added form consolidates all the comments and is especially useful for front desk and data entry employees. The system administrator easily creates and/or modifies the forms when new data elements or changes are required.

A custom module supplied by our system integrator produces all letters mailed to applicants, replacing the cumbersome mainframe merge and print process. When a button is clicked on one of the workflow forms, a Visual Basic program extracts the necessary data from the workflow database, temporarily stores it on the local workstation, and launches the word processor. The letter text is merged with the extracted data and reviewed by the operator. After any changes are made, the letter is printed for mailing to the student and an image of the letter is automatically indexed and stored as part of the applicant's virtual folder.

Another custom feature of the system is the ability to hold transcripts or other documents in a searchable "suspense" file until an application arrives for that student. No action is taken on these documents until a matching application arrives and they are attached to the student's virtual folder. This feature has virtually eliminated the problem of "lost" transcripts.

Benefits of Document Imaging

The most noticeable benefits of document imaging are the absence of piles of paper in the Admissions Office and shared electronic access to all application materials. Paper admission file folders are a thing of the past, and substantial savings has been realized because staff in the Admissions Office and at the branch campuses no longer spend time tracking down "lost" folders or documents.

Customer service staff members have immediate access to a student's virtual folder without interrupting processing. They are able to give informed and accurate answers to questions regarding a student's information or status. Other offices across campus, including Athletics, International Programs, and Multicultural Student Services, can also view and track a student's progress through the system. Advisors in academic departments can see or print transcripts and transfer credit reports themselves, eliminating the need to make and mail copies from the Admissions Office. Because the branch campuses are able to scan and index documents that they are received, they no longer need to fax, mail, or send application materials by courier to Pullman.

Other benefits include:

- All campuses and departments have access to all imaged documents, including all letters sent to students regarding status, missing documents, transfer credit, etc.
- Admissions application processing flow is triggered and monitored electronically, not by file folders passed from desk to desk, and office to office.
- Permanent "file folders" for students who enroll are now maintained and available electronically, not created and transported to the vault in the Registrar's Office.
- Staff members have the ability to make and view annotations of different types added to the images.
- Management information, including counts of particular kinds of documents in the process, etc., is readily available.

Benefits of Electronic Workflow

Since implementation of the imaging system, admission application processing is totally driven by the automated workflow designed and developed by Integra and WSU. The system currently contains more than 12,000 applications in various stages of processing. Along with the benefits listed above for document imaging, realized workflow benefits include:

- Electronic workflow has standardized procedures across the university, including the branch campuses and Extended Degree Program.
- Changes in business practices are easily programmed and implemented in the workflow rules.

- Transcript evaluation has been efficiently centralized in Pullman, with no delays for mailing or faxing transcripts.
- Processing workloads are effectively managed using workflow tools.
- Process reporting and tracking tools allow management to strategically allocate staff time and target specific groups of applications for priority processing.
- A complete history of actions taken on every student is kept automatically by the system.

Lessons Learned

As one of the first client-server application installations in the student services area at WSU, this was a complex project and required more coordination, consulting and monitoring than expected. Defining the relationship between the vendors and WSU and the responsibilities for work on the project was a challenge. Issues emerged involving communication, points of contact, and roles, both internal and external to WSU. Executive support, active user involvement, and an energetic champion proved critical for success and the need for them should not be underestimated

Because of the business cycle of the Admissions Office, an aggressive implementation schedule was undertaken despite the risks involved, and the system went directly into production mode with no parallel processing. All problems and bugs that surfaced immediately affected the ability of users in the Admissions Office to do their work. To mitigate this problem, a test system has been put into place for future implementations, enhancements, and upgrades.

Equipment requirements for the users were underestimated at the beginning of the project. Everyone in the office relies on the system to do their work and the need for large, high-resolution monitors and powerful processors at every workstation quickly became apparent. All workstations and monitors in the office have now been replaced or upgraded.

The timeline for the Admission Office business cycle was not sufficiently considered in the design of the storage strategy for images. Because an application may remain in the process for as long as nine months, removing the associated images from cached storage with quick retrieval time and forcing retrieval from optical disks with significantly longer response time resulted in huge frustration for the users. The solution has been to increase the size of available cached storage and to keep all images there for a complete application cycle. All documents needed for processing are now available almost instantaneously.

Approximately half of WSU's undergraduate admission applications are received via the Web. When the system was initially implemented, these were downloaded, printed, and then set aside for scanning and indexing. The system has since been enhanced to create images from Web applications in the same way that letters generated by the system are stored as images without printing and scanning. The images are indexed using a module that automatically matches to the student's record on the mainframe student information system or creates a new record. The transaction to create the workflow package is automatically generated, and the application sent into the stream of processing without the need of any operator involvement.

Because the imaging and electronic workflow system was built on an NT platform and the student information system is mainframe-based, data entry on both the workflow forms and on the mainframe was required when the system went into production. A project to design and build data feeds between the two systems has eliminated this duplicate data entry. Now when a student is admitted, the credentials analyst needs only to change the status on the workflow form, and the student's status in the mainframe information system is synchronized automatically. When a student changes his/her address using WSU's Address and Telephone Maintenance service on the Web, the change is automatically imported into the workflow database so that any letters are produced with the most current address.

Future Plans

While we are extremely pleased with the imaging and automated workflow systems that have been implemented at WSU, we also have a growing list of ideas for enhancements and processing improvements.

After using the original implementation of workflow for two full application processing cycles, an effort is currently underway to examine the Admissions Office business practices and rules. The models developed and metrics extracted from the database will drive a long-awaited reengineering of the workflow and reallocation of personnel to gain processing efficiencies and further improve customer service for future application cycles. The plan is to combine previously fragmented, piecemeal tasks so staff can take responsibility for larger chunks of the process, with decisions made closer to the point of actual customer service. The flexible technology of the system makes it possible for valueless and redundant steps to be removed and provide automatic, systemic control for the process.

We are currently involved in a project to receive transcripts from the state community colleges via EDI (Electronic Data Interchange). When the project is complete, the EDI data for a transcript will be automatically converted to an image and stored in the system in the same manner as Web applications. The student's workflow package will be updated to show that the transcript has been received and is ready for evaluation. Automating this route of receiving transcripts and eliminating the need to scan and index them will result in substantial time-savings, especially at the end of a processing cycle when almost every transfer student submits a final transcript.

The Registrar's Office is planning to use the Admissions Office scanning and indexing tools to make the permanent records of 40,000 current and former students available for retrieval using the imaging system. The current procedure is for an Admissions Office staff member to manually retrieve a required file from the vault, walk it over to the scan station, wait while it's scanned and then return the paper file to the Registrar's Office. When the back scanning is complete, this time-consuming trip will no longer be necessary.

We plan to implement Web access to documents in the imaging system. The next version of the Optika software actively supports the Web as an interface to both image retrieval and workflow processing. Web access will remove the need to install client software on the casual user's workstation. This will make it easier to broaden the use of the imaging system in the academic departments throughout WSU and to academic advisors in any location.

Student email address is currently collected from the admission application and stored in the workflow database. When university policy and procedures have been worked out, an enhancement will be made to the electronic workflow process to trigger automatic email for specific actions, such as the receipt of a transcript. When a transcript arrives and becomes part of a student's application package, the student will be sent an email message. This automatic notification should greatly decrease the volume of telephone calls to the office asking if a transcript has been received.

WSU is also investigating the use of optical character recognition (OCR) to feed data into the imaging and workflow system. The biggest return would come from using it to read applications and transcripts submitted on paper, and since the trend seems to be moving rapidly toward the Web and EDI, this idea may be abandoned for the Admissions Office.

We would also like to apply imaging and electronic workflow to processing needs in the Graduate School. Graduate School staff members already use the system software to search the "suspense" holding file for transcripts and to view undergraduate admission files. Web access and annotation of images and electronic workflow on the web will be invaluable to graduate coordinators and committees who make admission decisions for applicants to the Graduate School. Program evaluation and graduation processes could also benefit from the use of imaging and workflow technology.

Conclusion

Imaging and automated workflow have enabled a major transformation of the admissions process at WSU. Even casual observers have noticed the change in the office, and the staff openly wonders how they survived without the system. As an example of their enthusiasm, and testimony that reluctant staff members can be transformed as well, the following quote was excerpted from an email sent to the university community by the transcript evaluator team:

> *"Greetings from the Office of Admissions Evaluators! To borrow a phrase from one of The Pointer Sisters' songs: "We're so excited!!"... We just have to share with everyone our good news! ...as most everyone is aware, we are working with an imaging system in our office. While being paperless was at first a challenge, we believe that it has dramatically changed our lives and allowed us to work more efficiently. ...for those with access to Optika (our imaging software), you*

> *can view and print your student's TCR (Transfer Credit Report) almost as soon as we produce it."*

The imaging and automated workflow project instituted sweeping technological, administrative process, and organizational change, and has created a major shift in culture in the Admissions Office. With continued enhancements and exploitation of other features of the technology, we hope to maintain a high level of user satisfaction and realize even more processing improvements in the future, as WSU continues its commitment to deliver high-quality education and customer service to the next generation of students.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0047

Title: Digital Subscriber Line Services

Author: Mary L. Pretz-Lawson and Carlos L. Zertuche

Organization: Carnegie Mellon University and Stanford University

Year: 2000

Abstract: Carnegie Mellon and Stanford have independently participated in several Digital Subscriber Line (DSL) trials since 1996. In 1998-1999 both institutions rolled out respective production DSL services. Stanford partnered initially with Covad, and Carnegie Mellon with Bell Atlantic. Both universities retained responsibility for Internet Service Provider functions. Today each has 350-400 subscribers representing all campus sectors. This session will review Stanford and Carnegie Mellon's DSL configurations while focusing on the technical, operational, and support challenges.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0016
Title:	Digital Video -- From the Desktop to Antarctica
Author:	David N. Hutto
Organization:	Blue Ridge Community College
Year:	2000
Abstract:	This narrative describes the processes and technologies employed to produce and deliver a series of complex interactive learning experiences that brought together working scientists in the Antarctic with students and teachers across North America. This multifaceted program included field production in the Antarctic, the use of experimental communications technologies to provide real-time interactive communication from across the globe, and the re-purposing of the educational materials from the live programs to produce an exciting and engaging interactive CD-ROM and Web site.

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Digital Video – From the Desktop to Antarctica

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This narrative describes the processes and technologies employed to produce and deliver a series of complex interactive learning experiences that brought together working scientists in the Antarctic and students and teachers across North America. This multifaceted program included field production in the Antarctic, the use of experimental communications technologies to provide real-time interactive communication from across the globe, and the re-purposing of the educational materials from the live programs to produce an exciting and engaging interactive CD-ROM and Web site.

The Mississippi State University Television Center (UTC) has been involved in producing interactive television programming since 1988. The unit's early involvement in satellite-based programming evolved into broadband fiber optic programming through participation in designing the nation's first publicly switched fiber optic distance learning network in 1991- Mississippi Fibernet 2000, (a public/private demonstration project). The Television Center's evolution continued into the realm of compressed video, streaming media, and interactive media development. The organization's staff and facilities have made the transition from a traditional television production facility to a full-scale multimedia, distance learning production unit capable of originating on-location or studio based interactive programming. The Center's facilities include nonlinear audio and video production suites, multimedia production work areas, interactive studios, and a hybrid production/KU uplink truck that has traveled from Pasadena to Nashville to originate national distributed interactive programs.

In recent years, UTC has been in the nucleus of some of the most ambitious distance learning projects in the nation including: "Live from the Stratosphere" that featured students and teachers interacting with scientists flying in NASA's KIPER flying observatory; "Live from Mars" which brought JPL's rocket scientists together with students at museums around the country when the Pathfinder spacecraft successfully landed on Mars; "Live from the Poles" that provided interactive programming from the North and South Poles; and "Live from Antarctica 2" the focus of this presentation.

The "Live From" series is produced by Passport to Knowledge, a Morristown, New Jersey company lead by Geoff Haines-Stiles and Erna Akuginow. (www.passporttoknowledge.com) A mutually beneficial working relationship was established between PTK and Mississippi State University shortly after the UTC's support of the "Live From the Stratosphere" program. PTK had established a proven track record working with NASA, NSF, the American Museum, and PBS. MSU had strong ties to NASA and NSF as well and considerable experience in distance learning program production. Our organization found the programming links through PTK to coincide with the outreach mission of Mississippi State University.

"Live From Antarctica 2" was a series of three one-hour interactive television programs produced by Passport to Knowledge with considerable production support from the Mississippi State University Television Center in Starkville, Mississippi. This ambitious undertaking involved establishing live bidirectional television broadcasting facilities in one of the most remote, and hostile areas on the planet – the Palmer Peninsula of Antarctica. Through these experimental facilities, NSF researchers would be connected to the program originating facility at Mississippi State University in Northeast Mississippi and ultimately to students and teachers around the country through PBS and NASA-TV. Through a mix of communications technologies, students were able to ask questions and receive responses from the scientists working at their field research stations. The goal of the project was to bring science to life and to vividly illustrate the problems, challenges, and rewards of gathering research about the valuable wildlife, natural science, and ecosystems of the Antarctic. The programs clearly portrayed the awesome beauty and granger of the region and the immense value it has to our planet. The programs also provided a close-up view of what it is like to be a scientific researcher working in a challenging setting. The coordination and production of the series was an adventure that challenged the both the human and technology limits of all involved.

The Executive Producer of the series, Geoff Haines-Styles realized that getting a television signal out of Antarctica would not be an easy task. Geoff has a unique ability to find resource where no man (or woman) has gone before! His background as the director of the Cosmos series for PBS no doubt helped form his deep appreciation of science and sense of adventure inspired all of us involved in the electronic journey to Antarctica.

Through Geoff's special arrangements with NASA we were able to use the agency's ACTS (Advanced Communications Technologies Satellite) system to transmit signals to and from the region. This experimental satellite allowed our field production unit to use a small transportable uplink to broadcast a signal that could be downlinked at NASA's Jet Propulsion Lab in Pasadena. The audio and video signals were then digitized and compressed and sent more than 1700 miles across the country using a dedicated T-1 telecommunications circuit to Mississippi State University where the broadcast was integrated into the program mix.

Questions from students were brought into "Communications Central" at MSU from remote sites using transportable KU uplinks and compressed video facilities. For example, a group of middle school science students traveled to the NASA Stennis Space Center in Bay St. Louis, Mississippi where they were able to interact through video conferencing facilities. At other points in the programs, groups of students asked questions from a schools in Maine, California, Ohio and other locations where a transportable uplinks sent signals to MSU for inclusion in the program. Each program involved multiple origination sites from around the nation using similar technologies to support the question and answer segments of the program. E-mail and Fax questions were also received from students viewing the program over state or national educational networks. The rather significant technical challenge at MSU was how to synchronize the signals from multiple remote sites with the signal from Antarctica that was relayed through the JPL to MSU. The engineering team at MSU was lead by Mike Godwin, Chief Engineer with support from Andy Sims, Digital Systems Administrator, and Scott Lewis, RF engineer. These three individuals did an exceptional job in overcoming every technical obstacle that came their way. The Jet Propulsion Lab, which was also evaluating the ACTS system during our production, provided two engineers who were soon adopted by the Mississippi State team (Ann Deveraux in Antarctica at the Palmer Station T-5 transmitting station and Tom Rebold at MSU who was introduced to both Catfish and grits and survived!)

Since we were several time zones and half a globe away, often tape feeds from the field producers in Antarctica were made during the early hours of the morning when the

ACTS system was available for our use. Raw video and some pre-produced segments were digitally transmitted the Antarctic for editing at the MSU facility. Throughout the process the video quality remained good considering that the signal had traveled some 50,000 miles to get to us.

Several late night editing sessions were a necessity to modify the content of the packages which were included in each show. Videotape editor Ralph Olivieri, who was also the operations manager of the Television Center was the principle editor who worked closely with the executive producer and the program's director, David Hutto.

All the show elements were produced at MSU using either nonlinear or traditional editing suites. In many cases, special graphics were produced using the raw material received from Antarctica through the ACTS satellite. Image processing software, and digital compositing software such as Adobe AfterEffects were used to animate elements, "factoids," and transitional graphics, which added an extra dimension of quality to the production. Most of the graphics were designed and produced by Paula Hindman, Video Graphics Coordinator for UTC, who put in countless hours of work in developing high quality digital images and animations for the shows.

Minute by minute scripts were developed for all segments of the programs with careful attention given to time for interactive elements, student questions, and videotape segments. For each live program, an extensive set of contingency plans were made in the event of a signal loss from Antarctica (which happened three times during the broadcasts).

The organization of the educational components of the programs was well thought out and designed. A set of teacher resources was developed that provided schools with suggested lesson plans, maps, slides, audiovisual aids, videotapes, and resource links to prepare the students at local schools for the live "electronic field trips." When the broadcasts occurred, they were the culmination of several weeks of preparation that involved a comprehensive study of Antarctica.

A web site was also developed by PTK that was a significant support tool for the project. Teachers and students could access resource materials including maps, graphics, and other material that complemented the work in the classroom. Of particular interest were the journals of the scientists and researchers who were working in Antarctica. These online journals added personal insight into what it was like to live and work in this difficult but stimulating environment. The site is still active for review by interested individuals.
(http://passporttoknowledge.com/antarctica2/index.html)

The questioning strategy was well thought out and planned. The questions from the schools were all student questions, but were selected to support the educational objectives of each show theme to maintain continuity. A "Question Coordinator" monitored the "live" questions coming in through E-mail and FAX and coordinated them with the executive producer and host. At the appropriate time, in the right order (most of the time) the questions were asked by the students or relayed by the show host from MSU. A contentious effort was made to have a representative balance of questions from different parts of the country and from students with diverse backgrounds.

When the programs came together, the final products were rich adventures for young scientists and their teachers around the country. More than 2.5 million students and teachers participated in the three programs that were broadcast by PBS's Teacher Support Services, NASA-TV, numerous state and regional educational networks, and local PBS stations.

The Development of Asynchronous Interactive Media

After the dust settled, we realized that more than 100 hours of original video footage was in the library, scores of original graphics, video packages, animations and sound effects that could be used to create a more in-depth interactive educational project. Geoff and I discussed in detail the possibility of repackaging all of our hard work into a more transportable, useable product for schools. The logical byproduct of this extensive collection of exciting material was to develop an interactive CD-ROM.

To accomplish this goal, a development team had to be formed. The TV Center Director, David Hutto would serve as Production Coordinator and Senior Designer. The Television Center's Special Projects Producer, Lamont Berger would be responsible for video editing and compressing all video sequences for the project. The missing member of the team was an accomplished graphic designer and multimedia programmer.

Since Mississippi State University is one of the few institutions in the nation that offers an MFA program in multimedia, it seemed only logical to recruit a qualified 2nd year graduate student who could benefit from the experience. The MSU Art Department recommended Erich Belk as a prime candidate for the project. After several meetings and some negotiation, he agreed to accept the challenge. The multimedia program at MSU is under the supervision of Ms. Anna Chupa who is turning out some highly qualified and talented young professionals. With our team in place, we were ready to begin.

The process for the development of the CD-ROM could be of value to those who may wish to attempt to produce a rather complicated CD-ROM. First of all we had to clarify our target audience, of course which turned out to be middle school science students. Secondly, we had to define the technical common denominator for distribution– the minimum computer platform used by our audience. Our research indicated that most of our target population would have access to Pentium II PC's with 64 MB's of RAM that had at least 4x CD-ROM drives.

With these minimum user requirements in mind, we began to experiment with graphics, video, and sound that would playback from a CD on this defined standard. Considering the nature of the content available for the project, maintaining the highest quality was a primary design consideration for the development team. After some experimentation, we determined that the computers should be able to support a color space of thousands of colors as a minimum resolution. Our thought was that we would not try to design for the minimum standards at the time of production but aim instead toward a technology target at least one year in advance of our project's completion date. This decision in the short run might limit the potential distribution numbers, but in the long run would allow us to design for a higher quality output. Our logic was that most schools would catch up with us and pass our design standards quickly. Our strategy thus far has proven to be true.

The project director, Geoff Haines-Stiles was hopeful that as much of the Antarctica impressive library of material as possible could reside on the CD. Given our storage universe of 650 megabytes, the archiving capacity of a CD-ROM, this was a major challenge. One of our first steps was to determine how much video, audio, graphic, and text material could go into the project.

Toward this goal, we developed a project flow chart that mapped the content areas of the CD. At first broad strokes were used to define major areas of interest such as *Getting There, Transportation, Animals, People, Research, Weather, Survival on the Ice , Journals*, etc. in order to organize logical groupings of the resources. Next, we looked at the graphical interfaces, interaction design and navigation issues that would make the content easy to find and access.

Our principle designer, Erich Belk, was a gifted graphic designer as well as an excellent multimedia programmer. Erich developed the look and feel for all of the graphics for the project, designed the navigation icons, maps, section interfaces, and visual elements of the CD. Throughout the process, the work was evaluated by Erich's MFA thesis committee for aesthetic value, programming design, and logical content flow. This review process added a valuable dimension to the visual aspects of the project.

Several content management challenges were presented to the team. After an extensive review by the Passport to Knowledge staff, more than 100 minutes of video content were selected as vital to the program. In addition, it was deemed essential to include selected journals of the scientists and researchers, graphic images of animals with text descriptions of each and an audio file to let students know how each animal sounded.

It was not possible to store 100 minutes of full motion video with audio at the traditional 640 by 480 resolution so the size had to be reduced. The design team was concerned about loosing the quality of the sparkling original footage shot in Antarctica. A number of approaches were evaluated in our efforts to maintain high quality at a reasonable size. Different compression codecs, frame rates and image size combinations were evaluated over a period of about a month. Our final solution resulted in digitizing all of the scenes needed for the project and editing the packages on a Media 100 nonlinear editing system at an image resolution of 640 by 480 pixels per inch (ppi). When this process was complete, the edited packages were exported as composite QuickTime Movies at 640 by 480 with audio. The exported movies were then cropped to remove some undesirable NTSC video characteristics such as VITC (Vertical Interval Time Code) and video head switching pulses on the bottom edge of each movie and compressed using Media Cleaner Pro at 320 by 240 ppi. The Sorenson Codec was used for the final compression to improve the image and audio quality. Custom settings were developed to control contrast, frame rate, deinterlace the frames, and to adjust image quality. A frame rate of 15 frames per second was chosen to reduce file size and still maintain acceptable smoothness. The resulting quality was very acceptable for playback on a 4x CD-ROM on a medium quality PC and Macintosh. In the end, we were able to include more than 100 minutes of full motion video on the finished product at very acceptable quality levels.

The major software development platform for the project was Macromedia Director. This particular software package is the foundation for the Multimedia Program in the Art Department at MSU and was familiar to the designer. In its final version, the CD is actually composed of numerous individual Director Movies tied together. This approach was taken to make file management easier and less cumbersome. In the original development version of the project, several "Extras" were used to maintain Alpha Channels on graphic images that were imported into the Director Programs. Other software programs that were very useful were Adobe Photoshop, Painter Most of the programming and image processing work was done on Macintosh Power PC's (G-3's with a minimum of 128 MB's of RAM) with proofing and testing of release versions done on Pentium II PC's with 64 MB's of RAM.

The "map" metaphor was used throughout the CD as a means of logically organizing the material and also as a means of orienting the young explorers to the content. Each location on the map provided information about how a person travels to the region, the research conducted there, and on the wildlife that lives in the area.

Creating the navigational interface for Awesome Antarctica, as the CD was now called, was crucial. Our goal was for the interface was to encourage students to explore the continent as an adventure. Not everything is directly presented to the explorer upon arrival, but is revealed through rollovers as the mouse is moved around the textured surfaces of maps of the regions covered by the CD. The navigation process, however, is very logical in its presentation. Animal pages are linked to McMurdo for example, because that is where most of the animals are found. Subtle points of fact are presented through the experience of accessing the information on the CD.

To make the content more interesting for students, we decided to develop a character to introduce each segment and serve as a humorous guide. Enter Penny the Penguin, an Emperor penguin with a cartoon voice who would pop up from time to time to introduce new elements of the CD. Penny was created with Macromedia Director as a movie loop. Its beak was rotoscoped to give the impression that it was speaking roughly in time (not exactly in sync) with the voice. Actually lip-syncing the voice would have taken us well beyond the scope of the project and completely blown budget, patience, and time goals.

The insightful journals of the Antarctic scientific team were valuable documents that we wanted to include on the CD. Our designer developed an attractive interface that included a picture of the individual scientists along with their journals. Where possible, this information was placed in close proximity to the video segment about their research.

The fascinating wildlife of the continent was displayed in its own section. To make this collection more interesting, we used high quality graphics of each animal represented along with a digital audio file of its sound. In most cases, we used sound from the video recording that we had acquired in the library. For some species, we used recordings collected by an independent recording artist who specialized in gathering sounds from nature. We found that the sound files needed to be digitized at 48 KB per second resolution to maintain adequate quality for our purposes and then recompressed at a lower rate to reduce file space when we integrated them into the CD. (The process was refined after numerous tests were done at different compression rates.) The links to the sound files were included in the fact sheets about each animal.

The major development of the CD took almost one year to complete. It involved the work of two graduate students over the course of a summer and consistent but not full-time involvement of a graduate student and one professional producer for the remainder of the year. Minor tweaking will be done after the final report from the focus groups is completed. When completed it will be made available to interested teachers and schools throughout the nation.

In retrospect, the project was a rewarding academic experience for the graduate students and faculty who were involved in the development and production process. The development of the CD allowed the MSU Television Center to explore and refine the process of digitizing media for CD distribution and to acquire new skill sets for multimedia development and production. The public/private partnership with Passport to Knowledge was informative and beneficial to all of the staff who participated in the project. It is our hope that the lessons learned in developing Awesome Antarctica will provide a solid foundation for future opportunities to grow in this exciting field of study.

APPENDIX

Brief Biography of David N. Hutto

David Hutto was raised and educated in Alabama. He grew up in a rural area of North Alabama where he learned to appreciate the beauty of nature, the simple values of hard work, and the joy of intellectual pursuits. He received his B.A. degree from Birmingham-Southern College, a demanding liberal arts institution, and a master's from the University of Alabama. Later he would do post-graduate work at Mississippi State University in educational media and programming. He has worked as a director of advertising production developing film, television, radio, and print material for campaigns and media outlets. He is a writer, media producer, and an administrator. For the past 25 years, he has been involved in higher education in a number of leadership roles.

He established the first television studios and full-time radio station at Mississippi State University. These state-of-the-art facilities rival any in the southeast and provide digital production capabilities for nonlinear audio and video editing, interactive studio production, distance learning program distribution through fiber optics, compressed video, and satellite communications. His unit also produced on-location programming through a hybrid video production and transportable KU uplink. Most recently, the TV Center has moved into streaming media production support and interactive media development.

Hutto has served as executive producer for national ALS programs for PBS, numerous instructional television series, interactive distance learning programs, and for multimedia programs for CD-ROM and Internet distribution. He is currently the Dean for Technology and Development at Blue Ridge Community College in Flat Rock, North Carolina where he is responsible for telecommunications, data operations, distance learning and instructional technology, public information, institutional planning, research, development, and institutional effectiveness. The College has just launched a new distance learning center and is expanding its digital media development capabilities under Hutto's leadership.

The presenter is also a writer and artist who has just published a collection of "wordscapes" titled "When Autumn Comes." The works include the title poem that was featured on NPR's *All Things Considered* in 1997. The wordscapes are narrated by a variety of voices and are accompanied by music and sound effects.

Live From Antarctica –2 Production Team

Passport to Knowledge:

Project Director:
Geoff Haines-Stiles

Executive Producer:
Erna Akuginow

Mississippi State University Television Center

Senior Producer and Director:
David N. Hutto

Technical Director / Video Tape Editor
Ralph Olivieri

Field Videographer – Antarctica
Bryan Ingleman

Show Host:
Cammile Moody

Video Graphics and Animation:
Palua Hindman

Chief Engineer:
Mike Godwin

Digital Systems Administrator:
Andy Sims

RF Engineer:
Scott Lewis

Awesome Antarctica Development Team

Passport to Knowledge:

Project Director:
Geoff Haines-Stiles

Content Editor:
Erna Akuginow

Mississippi State University Television Center

Production Producer and Senior Designer:
David N. Hutto

Graphic Designer and Multimedia Programmer
Erich Belk

Video Producer and Multimedia Coordinator
Lamont Berger

MSU Art Faculty
Anna Chupa

SOFTWARE USED:

Multimedia Programming:
Macromedia Director 6.5 and 7.0

Audio Processing:
Sound Edit 16
ProTools – Session 8

Image Processing:
Adobe Photoshop
Fractal Painter 5.0

Digital Video Editing:
Media 100
Media Cleaner Pro

Video Compositing:
Adobe AfterEffects

CD Burning:
Toast

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0053
Title:	Federal and State PKI Bridge Evolution: Cutting Across Stovepipes
Author:	Robert F. German, Jr., Richard Guida, and Shirley C. Payne,
Organization:	University of Virginia and Federal Chief Information Officers Council
Year:	2000
Abstract:	Representatives from the U.S. Federal and Commonwealth of Virginia PKI Bridge Projects will discuss the challenges of designing technical architectures, policies, and organizational structures for public key infrastructures that meet interoperability needs of multiple entities. The outcomes of both projects and valuable lessons learned will be shared.

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Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0062

Title: Getting the FACTS in Florida

Author: Linda Thanasides

Organization: University of South Florida

Year: 2000

Abstract: Florida has implemented the statewide student information system called Florida Academic Counseling and Tracking for Students (FACTS), a Web-based system that allows real-time communication between institutions. This session will describe the challenges of organizing and developing FACTS and the benefits being recognized by the participants.

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Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0058
Title:	High Quality Internet Video Conferencing is Here Now!
Author:	Robert S. Dixon, Mairead Martin, Tyler Johnson and Mary Fran Yafchak
Organization:	Ohio State Univ., Univ. of Tennessee, Univ. of North Carolina and SURA
Year:	2000
Abstract:	High-quality, full-screen, full-motion Internet video conferencing is now a reality and in daily use by universities throughout the world. This presentation will discuss starter systems and include live video conferences with people actually using this technology now for distant instruction and collaboration.

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Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0057

Title: Electronic Books: What's in a Name? Are We Really Talking About Books?

Author: Marcia Deddens

Organization: University of Cincinnati

Year: 2000

Abstract: The new EDUCAUSE Evolving Technologies Committee is charged with identifying and keeping abreast of evolving technologies and their impact on higher education institutions, and collectively sharing information about evolving technology products, services, and trends to the EDUCAUSE staff and membership. Members of this committee, who are generally responsible for tracking new technologies for their campuses, have studied the most important technology trends for this year and the next and will present their results for discussion with the audience.

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0050
Title:	Media-Rich Learning through Universal Computing and Wireless Thin Client
Author:	Mark Cain
Organization:	College of Mount Saint Joseph
Year:	2000
Abstract:	The College of Mount St. Joseph has implemented universal computing using "wireless thin client," a merger of three technologies: large CE devices, wireless networking, and Terminal Server/MetaFrame. This approach is powerful, low-maintenance, and inexpensive. The presentation will describe the project and the "media-rich learning environment" wireless thin client makes possible.

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Media-Rich Learning through Universal Computing and Wireless Thin Client

By

Mark Cain

For nearly a decade, the College of Mount St. Joseph has been aggressively implementing technology to serve learning. As a result, two thirds of the faculty use PowerPoint for presentations, create Web pages in support of their courses or use WebCT for course management. The College also has an active distance learning program. It will not be long before most courses will have a substantial multimedia component.

While technology now plays a substantial role in the College's educational processes, it has also posed several challenges. As the use of computers in the learning enterprise has increased, providing a sufficient number of computers for student use has been difficult. Teaching labs are near maximum capacity. We have too few general-purpose computers with which students can write papers, do homework assignments, check e-mail and surf the Web. In addition, students do not have remote access to the software that is in teaching labs. This is a particular problem for the College, because most of our students are commuters. In sum, the College has been building an elaborate media rich learning environment but has not possessed an adequate infrastructure to deliver it into the hands of students.

To address this shortcoming, the administration concluded that the College was ready for a universal student computing requirement. As we began to consider such a requirement, we realized that whatever we did must be affordable for our students. The College of Mount St. Joseph is a private institution, with tuition higher than that of its publicly-funded competitors, but its student body is not affluent. Many are the first in their families to attend college. Any technology fee necessary to support a universal computing requirement could not unduly strain the budgets of our constituents.

We also knew that we wanted our solution to provide for ubiquitous computing. Students should be able to access computer-based resources anytime, anywhere. As a corollary, the solution must provide for portable computing. It must be easy to access, easy to transport, easy to use. Whatever solution we came up with would need to work both on campus and off.

Certainly whatever we did would have to be functional. Students would need to be able to check e-mail, cruise the Web, take notes in class, complete homework assignments, write papers, and access the courseware that our faculty have been developing over the past few years. They would have to be able to access the software in the computer labs. This software directly supports class work and could range from programming languages to SPSS (statistical software) to Microsoft Project (project management) to FrontPage (Web page creation). The solution would need to allow the student easy access to library resources. (The College's library is heavily automated, with thousands of journal articles in full-text form, a large number e-books, and an electronic reserve system through which students can access images of reserve items. All of these are available through a Web front-end.) Finally, the solution would provide access to other campus services, including web registration and student records, electronic bookstore, etc.

The characteristics above would, at first blush, dictate a solution using notebook computers. However there are problems with using laptops for a population composed of college students. For one, the machines are expensive. Even a modestly priced one typically costs $1,600 to $2,000. They are too heavy, weighing between five and seven pounds. They take too long to power up. (Imagine that you are a student coming into class five minutes late. Your classmates are already working on their machines but you lose another minute waiting for yours to boot and an application to launch.) Finally – and here is the deal breaker – is the issue of battery life. After two hours, many laptops start beeping at you to indicate that they are running out of power. Unless the College wanted to run an awful lot of power into each classroom, long battery life was a *sine qua non* for the success of the project.

As we began to consider the limitations of the laptops, an alternative occurred to us. What if we could use large CE devices? The handheld PC pro line of CE devices are only slightly smaller than notebook computers, yet they offer advantages that laptops don't. First, they are relatively inexpensive; they can be purchased for under $1000 each. Second, they are light, weighing in at two to three pounds. Because they don't have a hard disk to spin up during a boot process, they are instant on and off. You can even shut them off in the middle of a file and not lose data. They also have a long battery life, typically eight hours.

A successful universal computing requirement, though, cannot just consider the device that is placed in the hands of the students. There is a whole infrastructure that must support it. Conventional approaches would have the students plugging into a wired network. That would necessitate network wires and hubs or many ports in each classroom, etc. Students would need access to course-related software. Because the needs would change from semester to semester, there would be the constant task of installing and uninstalling applications on student machines. This would be a support nightmare.

Taking all these factors into account, the College of Mount St. Joseph determined that a totally new model was needed for student computing. We call this approach wireless thin client. In the new model, each student would be equipped with a Windows CE-based hand-held PC pro. This CE device would have a monitor of eight to ten inches in diameter and an almost full-scale keyboard. Examples of such devices are the NEC MobilePro 880 and the Vadem Clio C-1050. On the CE device would reside basic productivity software, including pocket Office and a Web browser.

The CE device would have a modem for off-campus use. On-campus network connectivity would be via a wireless network card. In October 1999, Lucent WaveLAN came out with products based on the new IEEE802.11b High Rate (HR) wireless standard (11 Mbps). The College would blanket the campus with this technology. Wireless connectivity would allow the students to roam the campus while still maintaining access to the network, the Internet and network software.

One challenge was how to address the functional shortcomings of a CE device. The software available for the CE operating system is limited in number and power. However, the CE device supports the Citrix Independent Computing Architecture (ICA), making it a natural thin client. The College decided to employ server-based computing, using Microsoft's Terminal Server for Windows with Citrix MetaFrame. The software in the computer labs would be installed on this server and usable by the students just as if it were running natively on the CE devices. With this model, software upgrades could be made at a single location on the servers, rather than having to constantly install and uninstall software on each client device.

In 1999, the College conducted a technical proof-of-concept. Staff evaluated several CE devices in the middle two quarters of 1999 and selected the HP Jornada 820 for the pilot. At the beginning of the fall, a wireless network was installed on the top floor of the Residence Hall and in a workspace used by network and PC technicians. In November 1999, the College installed a test server, running a beta copy of Windows 2000 and MetaFrame. Initial software applications included Office 2000, Visual Studio Pro, Project, Internet Explorer, Adobe Acrobat Reader, and Oracle client tools.

Getting the three technologies (CE device, high-speed wireless and MetaFrame) to work together was a snap. The system ran flawlessly and quickly over the wireless connection. In December, the College used twenty laptops and CE devices to simulate a classroom setting. Our objective was to "break the server" or "bog down the wireless network" if we could. We couldn't. Performance continued to be brisk. The only two slowdowns we could perceive were some visual effects, such as dissolves and wipes, in PowerPoint and a file download taking an unusually long time. That file, by the way, was a 500-600 page technical manual in .pdf format. The Web browser installed on the Citrix server took about 2 minutes to download the file when all machines were attempting it at once.

One concern we had was power consumption on the handheld PCs. The wireless network card consumes considerable power, substantially cutting into the normal 8-10 hour battery life of the CE device. Happily, after more than two hours of intensive classroom simulation, the handheld PC battery was at 58 percent. We judged that this was sufficient for a student to get through his/her normal school day, which would typically consist of attending two or three classes, accessing library reserves and other resources, checking e-mail, even cruising the Web. All without recharging.

Based upon the success of the proof-of-concept, we proceeded. The new universal computing requirement, dubbed MERLIN (for Media Rich Learning Infrastructure) became a reality for freshmen entering in the fall of 2000. The technology was immediately integrated into two interdisciplinary courses that are part of a new core liberal arts and sciences curriculum at the College. Through MERLIN, students in these and other classes have access to class discussion lists, online pop quizzes, Web based simulations and case studies, and class exercises. Much of the software in the student computer labs, library materials, and the rich resources of the World Wide Web are also available. Each year, a new freshmen class will be added, along with additional wireless access points and MetaFrame servers. By Fall 2003, universal and ubiquitous computing at the College of Mount St. Joseph will be a reality.

MERLIN will solve a number of problems for the College. Classroom scheduling will be much more flexible because we will be able to have impromptu computer labs in any room on campus. The College will not have to give up precious general classroom space in order to install new computer labs. Yet the support issues of having more than 1400 additional devices on the network will be minimized, thanks to the use of CE devices without moving parts and a single software load residing on the Terminal/MetaFrame servers.

Mark Cain
Executive Director, Information Services & Support
College of Mount St. Joseph
Cincinnati, Ohio

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Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0070
Title:	Wireless Andrew: An Update on Lessons Learned
Author:	Charles R. Bartel
Organization:	Carnegie Mellon University
Year:	2000
Abstract:	"Wireless Andrew," the high-speed wireless infrastructure at Carnegie Mellon University, is the largest installation of its type anywhere. Started as a research network in 1994 to support Carnegie Mellon's wireless research initiative, Wireless Andrew has been dramatically expanded this year, installed in many of the academic and administrative buildings on campus. Presenters will discuss the challenges and opportunities faced in turning the vision of continuous connectivity into a reality.

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Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0018

Title: Access and Innovation: Partnering to Train Professional Workforce Educators

Author: Sharon P. Pitt, Julia S. Harbeck, Ed Vitale, Diane Foucar-Szocki, and Miriam E. Guthrie

Organization: James Madison University

Year: 2000

Abstract: Capitalizing on innovative technologies, effective partnerships, and a nationally unique curriculum, Virginia's Workforce Improvement Network, based at James Madison University, provides quality anytime, anywhere certification opportunities to professional workforce educators. This paper presents the online system, challenges of its implementation, and strategies for delivering online training to workforce educators.

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Access and Innovation: Partnering to Train Professional Workforce Educators

Authors: Sharon P. Pitt, Julia S. Harbeck, Ed Vitale, Diane Foucar-Szocki, and Miriam E. Guthrie

James Madison University

Harrisonburg, Virginia

Capitalizing on innovative technologies, effective partnerships, and a nationally unique curriculum, Virginia's Workforce Improvement Network, based at James Madison University, provides quality anytime, anywhere certification opportunities to professional workforce educators. This presentation will demonstrate the online system, challenges of its implementation, and strategies for delivering online training to workforce educators.

At no other time in history have critical stakeholders in the American workforce been so capable of creating, and so in need of accessing, a comprehensive delivery mechanism for widespread, quality, context-specific, anytime, anywhere education. The success of this workforce depends on the availability of and access to such learning opportunities. Demands for adult education, literacy programs, and professional workforce developers already far exceed the available supply from state and local agencies. Low unemployment rates, the lack of a comprehensive educational delivery system and an inability to capitalize on the opportunities afforded by new technologies available to the workforce system exacerbate these demands.

Challenges Faced by Workforce Educators

The Workforce Investment Act (WIA) of 1988 requires every state in the nation to develop an effective workforce improvement network and to foster a work-first culture. States and local agencies are responsible for streamlining workforce systems, providing flexible, inclusive and universal access to instruction, empowering individuals in learning, and working together to account for and report on work-first initiatives. Each state must not only develop an infrastructure for these networks but also design and develop curricula to meet the specific needs of their state's workforce. Fortunately, new technology and new partnerships enable local, state and national agencies to address these responsibilities.

The partnership of *James Madison University*, Virginia's *Workforce Improvement Network (WIN)*, and the *GTE Links Virginia for Literacy* project, is broadening past investments in educational opportunities for adult educators teaching learners within a work environment. These workforce educators are public or private adult educators involved with school-to-work and welfare-to-work transition programs, Workforce Investment Act professionals, community college personnel, public school educators working with employers, and managers/supervisors or trainers of employees.

Capitalizing on opportunities afforded by distance learning technologies, the partners have developed quality professional development options for workforce educators by creating a virtual campus that offers certified workforce learning instruction. To date, a unique curriculum of seven workforce learning topics, consisting of 29 instructional modules for online delivery that will prepare workforce educators to teach adult learners, has been developed and will be delivered via the Workforce Development Campus (WDC). In addition, three online assessments have been created that evaluate content expertise, technical literacy, and anticipated success in online learning environments. This workforce learning certification program is delivered via CourseInfo©, by BlackBoard, Inc., one of the distance learning systems available through James Madison University.

Instructors of the Workforce Development Campus will actively train professional workforce educators to develop workplace programs and curricular materials. The American workforce, in need of basic literacy skills, will benefit from training conducted with employer-specific materials in foundational skills like reading, writing, math, problem solving, interpersonal communications, critical thinking, English as a Second Language (ESL), and GED. WDC-trained workforce educators may eventually serve as workplace evaluators, program or curriculum developers, consultants, welfare-to-work and prison-to-work transition providers, instructors, trainers and literacy-training volunteers.

The Partners

James Madison University is the lead partner in the creation of the Workforce Development Campus and its online offerings. JMU has a long tradition of providing services to constituencies throughout the Commonwealth of Virginia and engaging in partnerships with schools, corporations, industry and public agencies.

The **Workforce Improvement Network of Virginia** is a statewide educational consortium focused on workforce improvement and adult education. WIN, funded by the Office of Adult Education of the Virginia Department of Education, is a partnership between James Madison University and the Virginia Literacy Foundation. WIN includes four institutions of higher education and 28 local public adult education and literacy providers in the Commonwealth of Virginia. WIN identifies and continuously prepares a growing cadre of competent professionals to respond to the needs of employers and employees.

The **GTE Links Virginia for Literacy project** was a collaborative effort of James Madison University, George Mason University, Old Dominion University, Virginia Commonwealth University, and the National Institute for Literacy (NIFL) to harness the power of technology to advance basic skills and workforce development throughout the Commonwealth. Initiated in March 1998 by a generous one-time gift of the Virginia GTE Corporation, the universities worked in partnership to respond to workforce literacy needs consistent with the requirements of their local area and the expertise brought by each institution. The National Institute for Literacy provided vision and direction particularly through LINCS, (Literacy Information and Communication System) bringing a national perspective to the work.

The project concluded in June 2000 with a meeting of key Virginia business and education leaders and GTE executives to share the results and plan for the future. Some of the results of the project include a curriculum for moving learners from welfare or unemployment to work; a graphically-enhance website entitled GED, JOBS and BEYOND, designed for the less-literate population seeking education, skills and employment; the establishment several state-of-the-art computer labs for use by adult programs throughout the state and the Workforce Development Campus.

Other key associations include:

The **National Adult Education Professional Development Consortium**, Inc. (NAEPDC), a consortium of State Directors of Adult Education, and the United States Department of Education, provides an avenue for informing adult educators about the Workforce Development Campus and promoting the value of certification nationwide.

The Electronic Campus of Virginia (ECVA), which represents 19 public and private institutions across the Commonwealth of Virginia, may also provide a venue for the delivery of WDC curriculum to potential workforce educators and serve as the test model for developing transparent, statewide certification and accreditation paths.

Transformation of Course Content

Longstanding relationships between the partners and a solid, existing face-to-face curriculum, the Workforce Improvement Network's Facilitator Guide, provided the foundation for development of online learning opportunities. The development team, which was comprised of an instructional technologist and a subject matter expert (SME), was charged with the task of transforming the existing curriculum of the Workforce Improvement Network from a traditional to an electronic learning environment. Though the team initially anticipated a simple translation of the Facilitator's Guide, the process of conversion really became a transformation process, leading to the development of a distinctly different curriculum that would address a change in audience.

The Learning Audience

The existing Facilitator's Guide, containing topics, modules, activities, and resources, was a compilation of many previously published materials collected into one source for use by WIN facilitators in preparing and delivering workshops. This compilation served as the foundation from which the instructional content of the Workforce Development Campus (WDC) emerged. These materials could be classified as train-the-trainer content since the original audience was WIN facilitators charged with instructing adult educators in the Commonwealth of Virginia. This comprehensive curriculum was already effective at local and state levels and was consistent with WIA (Workforce Improvement Act) goals.

The WDC audience, however, encompasses learners, not facilitators, who are or who want to be involved with workforce education. These learners could be adult educators in public programs, human resource development professionals in business and industry, and community college educators from anywhere that has an Internet connection. Since the audience changed significantly, one of the first tasks of designing the instructional modules was to change the focus of the instruction from train-the-trainer to learner-centered instruction.

Workforce Learning Content (7 topics totaling 29 modules)

The design of the *Workforce Learning* curriculum recognizes the diversity of workforce educators and the need to design and manage training at a local level where individual learners and workplace needs are best understood. The curricula is built around 29 specific modules within seven broad topic areas dealing with workplace education: **Introduction to Workforce Education, Marketing Workplace Education Programs, Planning and Designing Workplace Programs, Organizational Assessment in Workforce Education, Curriculum Development in Workforce Education, Instruction in Workforce Education Programs,** and **Program Evaluation in Workplace Education**. Each instructional module within these topics is designed to model effective adult-learning practice and principles and to encourage dialogue and active learning. These components form the basis for certification.

Course materials are designed for flexibility and responsiveness when providing professional development offerings to current or potential workforce educators. Within the curriculum, instructors are able to custom-design professional development options to meet specific learner needs. Online modules contain activities that meet varied instructor objectives and learner needs. The curriculum is designed to balance skill practice and functional context learning, fostering learner control, motivation, empowerment and opportunities to explore personal learning strategies and methodologies.

The transformation of the existing content from a collection of instructor's materials for face-to-face workshops to online content for learners was time consuming and complex. In addition to adapting the content for an audience of learners rather than instructors, a second level of transformation involved the material itself. The compilers of the original content chose the term "module" to indicate that the units of instruction within a topic were modular and could be re-arranged depending on the facilitator's intentions. The modules contained activities and resources. The resources were documents necessary for the completion of some, but not all, activities. Many of the resources were presented as overheads. Since the overheads only listed major points, additional material and background would be filled in by the facilitator's commentary as the overhead was being displayed.

Original materials were not intended to be used in their entirety, but to provide an outline for the workshop facilitators who would draw on their personal experiences to lead the workshops using any of the activities and resources from any of the broad topic areas in the guide as supplements. For example, a workshop leader might immediately sense by the looks on the faces of the participants or by the types of questions they were asking that an activity in a particular topic was not proceeding as planned or that the participants were lacking a fundamental piece of knowledge required to understand the activity. The leader could then stop the action, verbally explain what needed to be done, or pull out an additional resource, which may come from an entirely different topic area, and present it to the workshop members.

This ebb and flow of information presentation, which changed direction, as needed, is characteristic of face-to-face instruction and meets the needs of learners in this context. The organization of the original instructor's guide reflect the fluidity of the instructional process for these workshops in that the facilitators could pick and choose what activities and resources they needed. Therefore, the materials were largely self-contained and independent of one another. Since the facilitator was available to give a context to the topics and modules, it was not necessary to provide any textual description about how the materials were intended to work together to create a unified instructional experience.

The content and organization of the original guide was not appropriate for online instruction because the fluid approach to the face-to-face workshops, which is centered squarely on the experience and perceptions of the facilitator, is difficult to reproduce in an asynchronous online environment. Since the facilitator's live presence is absent in the virtual classroom, the instructional design and content of the WDC materials had to provide the background and context for the activities. A framework for each topic also had to be developed and supported; otherwise, the learners, working on their own at home, would lose sense of the "big picture" of where and why they are engaging in a particular activity. Because of the changed audience and the demands of online learning, the subject matter expert essentially re-generated the entire corpus of existing materials to meet the instructional needs of the web-based learner whose background in workforce education was unknown and whose questions and concerns had to be anticipated and answered in the online content. Rather than a "conversion" or even an "adaptation," the process of migrating the original content to WDC content could more accurately be described as a massive rendering of the original. The WIN materials acted as the foundation, but the resulting structure differs fundamentally not only in its delivery but also in its materials, design, and emphasis.

Pre-assessments Necessary for the Individualization of Instruction

Three assessments were developed to individualize instruction for the instructors who will manage the WDC topics and for the educators who will access the instruction online. The learners will take several pre-course surveys that will assess their technical skills, learning preferences, and their background experiences in workforce education. Learners will be queried as to their learning preferences to determine whether or not they are likely candidates for online instruction. If not, they may be encouraged to pursue alternate methods of instruction rather than participate in the online certification program. Based on the results of the pre-course assessments, learners and instructors were to be asked to take a tutorial on technical skills that was appropriate for their skill level. WDC staff would review the results of the assessment on background experience and establish which topics the learners should access.

Two tutorials were developed which present instructions on how to use CourseInfo© from an instructor's and a student's point of view. An additional tutorial was to have been developed which covered the basics of computer use and Internet navigation, for example, providing instructions on how to cut and paste and how to make a bookmark or favorite. Unfortunately, due to time and manpower constraints, only the student's and instructor's tutorials on how to use CourseInfo© were completed. The tutorial for basic computer and Internet skills has not been developed.

Certification

A number of options are available for receiving *Workforce Learning Certification* or college credit depending on the educators' experiences, the state where they live, and whether or not they are degree or non-degree seeking students.

Any WDC learner must be enrolled as either a degree or non-degree seeking student at James Madison University, the host site for WDC.

Educators who are both Virginia residents or are employed in Virginia and are non-degree seeking students are eligible to receive Workforce Improvement Network certification. Virginia's Workforce Improvement Network will work with other workforce improvement network initiatives throughout the nation to accredit the WDC certification in other states. In the near future, potential workforce educators who are degree seeking JMU students can receive JMU college credit for WDC topics regardless of their state residency.

Educators who are non-degree seeking JMU students residing in any state can receive the *Workforce Learning Certification* from JMU for taking any number of WDC topics according to a prescribed plan of study developed for them by the WDC faculty.

When any non-degree seeking educators enroll in the WDC, those learners will be asked to take a survey that assesses their experiences in workforce education. A WDC faculty member will review the educators' experiences, as recorded in the survey, and develop an individualized plan of study for that learner. This plan of study will list which topics the educators will need to complete in order to receive certification or credit.

Educators who successfully complete their plan of study will receive *Workforce Learning Certification* from James Madison University.

Technical Aspects: Using CourseInfo©

While adapting the original guide to an online environment, the development team also grappled with providing technically inexperienced learners with enough information to navigate efficiently in the Web environment via CourseInfo©. Although CourseInfo© has a fairly intuitive interface, in preliminary learner needs assessments, it was discovered that novice users, like the WDC learners, were easily confused and disoriented using this online medium Therefore, specific navigational guidance had to be integrated into every element of the instructional material. Each topic area contains information on how to save, print, and submit resources. Directions are also provided on how to access a link and when and where to select the "back" option. Though these instructions may seem redundant and unnecessary; users reinforced the need for repetitive and specific instructions at several presentations and workshops. The philosophy was adapted that if a user knew how to perform certain functions, for example, how to send an attachment, then he or she could ignore the instructions, but if guidance was needed, it was available. Non-technical language and consistency was a key concern in the development of user-friendly guidance.

In initial meetings, the development team spent hours reviewing the Facilitator's Guide and discussing what approach to take when presenting the materials online. Although these meetings were time consuming, they were critical to success as they allowed the team to understand each other's educational philosophies and to develop a common language. Fortunately, the team had a commitment to interactive learning, providing discovery learning precepts, and empowering the learner to create his or her own meaning through the development of learning communities (Bruner, 1971).

Since each online topic is taken as a separate, independent course, learners could not move from one topic to another, as was the case in the original, face-to-face delivery. The online topics present a tighter framework than the original guide and can be taken out of order. The instructional modules, however, within each WDC topic area are presented generatively, i.e. information from the preceding module is necessary for a complete understanding of the module that follows. The materials generate information from one step to another.

Each module, when appropriate, has activities where the learners:

- Review information in Resources or questions.
- Respond to questions that make them think about the information in terms of their needs, prior knowledge, and interests.
- Search for more information on the Web.
- Work individually or in groups, when appropriate, to apply or synthesize the information.
- Use the discussion board provided in CourseInfo to discuss the learner's or group's findings, responses, conclusions, or opinions with the rest of the class.
- When asked, join with all classmates to come to a class consensus on certain issues.

Not every activity within each module follows the structure outlined in these steps, but the overall framework is followed in every module.

An organizational framework using CourseInfo©'s folder/document system was developed that relied on the fewest number of clicks while at same time presenting a clean interface within the constraints of the delivery system. Once that organization was determined, it was repeated for each of the other seven topics. In addition, the development team tried to make sure that once each topic was ready to go online that it would not be changed. Changing any information in a topic once it was online often involved multiple steps. Unfortunately, as with any development project, revisions still had to be made. The team spent hours working in CourseInfo© to update materials and keep all of the text and formatting consistent across the seven topics. For example, when it was decided to change a definition in the introductory material about terms used in the topics, all seven topics had to be accessed, opened, and changed. In other instances, when a resource was changed, the original file had to be updated in Word, the CourseInfo© topic had to be opened, the course document opened, the file re-uploaded, and the link re-named. Therefore, a critical aspect of creating these materials was making sure that they were as complete and as correct as possible before they were put into the CourseInfo© format; otherwise, hours of production time could be wasted making revisions.

Training of Instructors

With help from all partners, the development team conducted a two-day workshop for eight instructors interested in teaching in the Workforce Development Campus. This was a somewhat politically complex task since several of the workshop attendants had key roles in compiling the original guide, which was now just one of several resources used to create the WDC curriculum. After learning about the process and the need for providing flexible online opportunities to more potential workforce educators, the original compilers understood the WDC to be a different product.

In twelve hours of training over the course of two days, the instructors were instructed through a combination of demonstration and hands-on activities. These users were, as a whole, inexperienced with the Web and basics such as file saving and sending attachments. Those with a little more computer and Internet background than others were called upon to help their less computer literate colleagues. The workshop participants also provided the development team with feedback on the WDC content as well as on technical issues. The most frustrating aspect of the workshop for the attendees was learning how to use the discussion board and the virtual chat.

Team Dynamics

The development team had an excellent working relationship. They are both advocates of learner-centered instruction, believe in the creation of knowledge through learning communities (Bruner, 1971), and have a healthy understanding of the promises and drawbacks of online instruction. The other individuals involved with the project were the project manager, the Director of the Workforce Improvement Network, and program support personnel. The development team was sometimes confused about the direction of the project, which led to several reiterations of WDC materials. However, after several meetings between the development team and the project manager, these misunderstandings were resolved. The difficulty in moving from a vision to a product reinforces the importance of continued assessment of the project mission, verbal communication, and written documents that are updated throughout the life of the project and shared with all members of the production team.

Using CourseInfo©

The primary benefit of using CourseInfo© is that it is accessible to any one who has an Internet connection. Instructors who want to create courses online do not have to buy or download special software as long as the institution with which they are associated has bought a site license. Course creators do not have to know html or any programming language in order to put a class online using CourseInfo©. However, knowledge of basic html tags for formatting text and creating links would be helpful in making the online text more readable and manageable. This online delivery system also allows course builders to make basic changes in the look of their site by changing the colors and shapes of buttons and by uploading banners with images. Any user with intermediate Web and computer skills can learn to use CourseInfo©. The threaded discussion board is a nice feature, which allows for archiving and for the submission of attachments. The group feature is also useful because small groups have access to their own file transfer, discussion board, chat, and email options. These options promote small group work and interaction.

The drawbacks to this delivery system are that the course designer has to work within the CourseInfo© interface, a situation that does not always lend itself to sound instructional design. The online manual is cumbersome and sketchy; it does not present the level of information necessary to fully grasp the capabilities of the program. CourseInfo© also does not provide file management capabilities. For example, student work must be organized in folders outside of CourseInfo© as there is no function for gathering student submissions into individualized folders. For an instructor whose courses are already extant in many other online systems, migration to CourseInfo© is very tedious and must be performed by copying and pasting. Novice users tend to be confused and overwhelmed by the interface. Because of the folder/document metaphor, a course builder must plan very carefully before putting any materials into the interface. If instructors find that they have five or six documents that would be better organized into one folder, each document must be recreated in the folder since there is no method of migrating documents into folders. In version 4.09, the email system and the chat room are the weakest components of CourseInfo©. Attachments cannot be sent, mail cannot be received, and there is no sent box in the email housed within the CourseInfo© environment. The virtual chat is extremely limited and has several bugs that need to be resolved by Blackboard Inc. before this option can be a useful instructional tool.

The Future

With the completion of the online *Workforce Learning* curriculum, the subject matter expert in the development team will teach two pilot offerings this fall. The first offering will be taught to WDC instructors, to evaluate topic content, train the WDC instructors and suggest redesign needs for all WDC offerings. In late fall, the first *Workforce Learning* topic, Introduction to Workforce Education, will be taught to actual students in four states. All WDC instructors will audit this offering. In addition, WIN will work with James Madison University to map credit and certification paths for workforce educators and establish accreditation/certification relationships with other workforce improvement initiatives in other states. The full certification program will be offered in spring of 2001 and the certification program will be marketed to adult/workforce organizations throughout the nation. JMU faculty will assess the quality of the *Workforce Learning* curriculum in addition to reviewing the program performance of WDC learners.

Lessons Learned

Visions are moving targets that are difficult to produce. Frequent revisits at all levels of the partnership to the project vision, mission and goals is critical to a successful operation. Communicating this vision, and what parts of the vision can be accomplished because of time, resources, and staffing period is also critical. Ongoing conversation between key decision-makers about what is possible must be maintained. In addition, all team members must have an equal and active voice in decision-making, as they are closest to the work and most able to articulate progress, impending issues and can best provide accurate time estimates

Most partners experience a technology learning curve. Education about technology, its potential, and its integration into the teaching and learning process is mandatory. Education about technology for content experts and training in the use of the system for all instructors should be integrated into the project life cycle. In addition, education about the management of technology projects is a critical component of the project partnership. All partners must have a clear understanding of the time needed to produce, change, and assess online instruction. Developing this understanding takes time. Success is more likely if the technology savvy partners invest time in continually reiterating the issues of online delivery and management. A lack of communication around these issues can be costly and could potentially derail the effort.

Design of instructional technology is a collaborative process and requires a communal language and a more than cursory understanding of the expertise of the partners. All partners, and staffing at all levels, must be proactive in making the design process collaborative, seeking to understand each other's discipline and goals, and seeking to define terms for an open, accessible exchange of knowledge and ideas.

Summary

The promise of technology is great yet the costs of technology are high. In the end, the results have the potential to transform current practice in significant ways. Taking advantage of the promise requires a tolerance of ambiguity, teamwork, vision, talent and the willingness to take risks. Using technology to create access and opportunity for lower-skilled workers and the professionals who teach them must be pursued for the American workforce to remain vibrant. Learning at work is increasingly the norm for executives, managers, supervisors and technicians. The investment in worker learning requires advocacy and creativity. Technology and the on-line mediums it makes available provide the greatest resource for providing quality learning at work for all workers, regardless of previous educational experience. The Workforce Development Campus is a small step in the investment in the largest population in America, the non-managerial employee.

Expanding the WDC campus to its fullest potential will require continued investments of time, talent, expertise and financial resources not often made available to adult and literacy educators. Through the generous support of GTE and the continued support of the Verizon Foundation and workforce educators throughout the country, the Workforce Development Campus will continue to grow and evolve.

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Abstract

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Bridging the Digital Divide in Higher Education

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Abstract

Making the educational experience inclusive of people with disabilities has benefits for all learners. Modifications and enhancements intended for learners with sensory, physical or learning disabilities often make the learning environment more flexible and engaging for students without disabilities. This paper will present several initiatives that promote inclusive teaching and learning, but also advance on-line learning, pedagogically and technically.

Introduction

The emergence of the digital campus, and the rapid convergence of previously disparate methods of communicating information, presents both a risk and an opportunity for people with disabilities. The imminent risk is that non-inclusive design of the digital campus will irreparably widen the "digital divide" within higher education, to the detriment of learners and educators with disabilities but also to the detriment of society as a whole. The opportunity is to use emerging tools and technologies to create more learner-directed, flexible, multi-modal learning environments, thereby reducing barriers and advancing education for all learners.

This paper will present the perspectives of two centers of expertise on inclusive teaching and learning: Project EASI (Equal Access to Software and Information) and the Adaptive Technology Resource Centre (University of Toronto). Initiatives that reduce barriers and advance educational practice will be discussed. Strategies for harnessing the "patterns of converging and emerging" trends to create a more accessible education environment, will be proposed.

The Adaptive Technology Resource Centre (ATRC)

Description of ATRC

The Adaptive Technology Resource Centre (ATRC) at the University of Toronto is a recognized center of expertise on access to information technology. The mandate of the ATRC is to foster the effective use of adaptive technology and the accessibility of information technology in education. This mandate is met in part through, research, development, consultation, workshops, publications, and participation in international forums. The ATRC assisted in establishing and is an active participant in the Web Accessibility Initiative of the World Wide Web Consortium. The Centre hosts several web sites on accessible teaching and learning. The Centre is also a consortium leader for a number of research projects related to accessible on-line teaching.

Accessible Courseware Authoring

Ever increasingly, education is conducted over the World Wide Web. The majority of curriculum on the web is created using courseware authoring tools or web authoring tools. With very few exceptions current courseware authoring tools produce inaccessible content, provide inaccessible student interfaces and cannot be used by educators with certain types of assistive technology. Accessibility guidelines for developers, utilities to check the accessibility of content and repair curriculum, and comparative evaluations of courseware tools and their products, are all initiatives underway to insure that as many students as possible can benefit from on-line learning opportunities.

Internationally adopted guidelines on how to create Web content that is accessible, is clearly laid out in the Web Accessibility Initiative, Web Content Accessibility Guidelines at http://www.w3.org/WAI. CAST provides a tool that can be used to assess whether content created for the web is accessible, www.cast.org/bobby. The ATRC has developed a tool that will both assist a courseware author in creating accessible courseware and in repairing the content if there are existing access problems. This program is called A-prompt and can be accessed at http://snow.utoronto.ca/aprompt. ATRC is working with courseware developers to integrate A-prompt into popular courseware products. In an area where there are few established principles of best practice, tools such as A-prompt can assist educators in establishing minimal standards of usability.

ATRC is also conducting ongoing evaluations and comparisons of courseware authoring tools and making these results available over the web. The evaluations consist of objective benchmarks and subjective ranking by users (both students and educators) who have disabilities.

Access to Science and Math

Most current career growth areas require a firm grounding in math and science. Unfortunately online math and science curriculum is inaccessible to people who are blind or visually impaired. Math notation is presented as graphic images that cannot be read by screen readers or refreshable Braille displays. A number of mechanisms are under development that allow the expression of math and science notation over the web in editable form.

MathML is a proposed markup system for math on the web. When adopted, MathML would allow math notation to be expressed on the web in an editable form that can be deciphered by text readers such as screen readers and Braille displays. At present while there are programs to convert MathML to LaTex, and programs to convert LaTex to Braille and speech, there is no system that makes it easy for a user of a refreshable Braille display or a Screen Reader to read MathML. Through funding from the Telecommunication Access Partnership Program of the Ontario government, ATRC is working to expedite this process, see http://www.utoronto.ca/atrc/rd.html. ATRC is also working with MathML viewer and editor developers to make their products accessible.

At present demonstrations, simulations and experiential learning exercises rely upon graphics, animation and video, and require manipulation using a mouse. This excludes a large number of students who cannot see or who cannot use a mouse. By adding modalities, such as the sense of touch and audio as speech and real world sounds, to these simulations and by allowing learner control of the experience through a number of input mechanisms, the experience is both more accessible to people with disabilities and more engaging and meaningful for all learners. Through several projects, the ATRC has worked to add haptics, or the sense of touch and tactile manipulation and audio, to interactive courseware. One example of haptic enhanced courseware includes a multimodal Periodic Table that illustrates the relative properties of elements, such as weight, through the sense of touch. Another example is a Haptic Pendulum model that illustrates the properties of a pendulum using a haptic device. Haptics and audio has also been used to communicate geographic structures and their spatial relation in multi-modal on-line maps.

Educating and Supporting the Educators

The ATRC established and maintains a web site intended to educate and support educators of students with disabilities. SNOW (http://snow.utoronto.ca) provides on-line professional development courses on accessible teaching, accessible curriculum, models of best practice, a comprehensive list of on-line, forums to consult experts and forums for peer discussions. (This project is partially funded by the Ontario Ministry of Education and Training).

Converging Technologies

With the emergence of broadband networks, educational television is exploring the delivery of interactive courseware over the Web. This poses the challenge of adopting a new paradigm for learning without abandoning the wealth of rich educational resources previously developed. In partnership with Canadian Learning Television and several other public and private sector partners, the ATRC is exploring the use of access tools such as captioning and video description as the basis for interactive learning. Thus, when watching a recorded lecture by Einstein on physics, if Einstein uses a word the student does not understand the student can select the word in the verbatim captioning and receive a definition of the word. If the student wants further illustration of a concept discussed she would again click on the word in the captioning and move to an interactive exercise or other illustrative material on-line. These interactive exercises can include the ability to feel forces, contours and textures through haptic devices. The student would also have the ability to adjust the captioning and video description to customize the type and level of assistance they desire. Thus the video description during a chemistry experiment could be verbose: labeling and describing each of the chemicals manipulated, if this is not already being done by the lecturer. The reading level or language of the captioning could be adjusted, thereby supporting second language learners and literacy development. Advanced captioning could be activated. This would allow captioning using any multi-media object as a video layer. Thus items can be labeled and highlighted, sign translation can be added, speakers can be identified and the paralinguistic elements of the audio can be better communicated. (This project is partially funded through Canarie, Inc.)

The Challenge of Multi-User Workstations and Smart Cards

One of the challenges faced by educational institutions is to provide barrier-free access to public or student workstations. Each student approaching the workstation may have individual preferences or needs regarding the workstation configuration. The administrative management and technical upkeep required to accommodate all these preferences is often prohibitive. Assistive technologies required by students with disabilities may complicate this further as the software programs often conflict with other applications and each other. The ATRC in conjunction with Devmark Inc., the Royal Bank and Once Corporation has designed a smart card system that allows users to instantly configure workstations by storing their personal preferences on a smart card. When the card is inserted into the smart card reader attached to the workstation, the preferred assistive technology is launched, personal preferences are set, the appropriate system tools are configured, and the preferred browser is launched and configured individually. When the smart card is removed the system is reset to the default setting. These smart card systems are presently being piloted at several sites across Canada.

EASI

Description of Easi

EASI (Equal Access to Software and Information) has adopted a motto: *"Students and professionals with disabilities have the same right to access information and resources as everyone else."* EASI is a core activity of the TLT Group, the Teaching, Learning & Technology affiliate of the American Association for Higher Education.

EASI's mission is to serve as a resource to the education community by providing information and guidance in the area of access-to-information technologies by individuals with disabilities. We stay informed about developments and advancements within the adaptive computer technology field and spread that information to colleges, universities, K-12 schools, libraries and into the workplace. Our supporters and friends comprise people from colleges, universities, businesses and other institutions. They include computing staff, disabled student services staff, faculty, administrators, vendors, representatives of professional associations, private consultants, heads of both non-profit and for-profit organizations, as well as faculty and staff from K-12 schools.

Collect and Disseminate Information

EASI has been awarded three grants from the National Science Foundation to collect and disseminate information about how to assist students and professionals to succeed in the fields of science, math, engineering and technology. EASI began making careful use of the Internet as the primary means to reach as many schools and colleges as possible for the least expense. Listserv discussions can be a waste of time, or they can be powerful tools to network with people with similar to your own. EASI's major list is easi and runs from a listserv at St. John's University (easi@maelstrom.stjohns.edu). In the early 90s EASI initiated axslib-l@maelstrom.stjohns.edu as a list for librarians to help them make their facilities more accessible to patrons with disabilities. After a short flirtation with Gopher, EASI made its real home on the web at http://www.rit.edu/~easi on a site generously supported by the Rochester Institute of Technology.

The first thing EASI has done as a result of the NSF grant was to highlight the work being done by other NSF award recipients in this field which includes research, development and demonstration projects. The NSF Program for Persons with Disabilities has sponsored over three dozen projects. A project based at Oregon State University directed by John Gardner has developed a Braille embosser that does a superior job of handling both Braille and raised dot and raised line drawings. It also has developed software that functions as a graphing calculator using sound to simulate the graph. The Georgia Institute of Technology is developing tools and techniques to make science labs more accessible for students with disabilities. This work is directed by Karen Milchus. DO-IT (Disabilities, Opportunities, Internetworking and Technology), based at the University of Washington and directed by Sheryl Burgstahler, selects promising high school students who have disabilities and have an interest in science and has a program to work with them and their teachers to prepare them for transition to University. It also prepares faculty at the University of Washington to accept these students in their courses.

Access to Science

The National Science Foundation quickly realized that students with disabilities were not being prepared in grade and high school for the sciences. Frequently, these requirements were waived, or the teachers just moved them along without making them learn the material. It sponsors several grants in K-12 primarily aimed at helping to prepare the teachers. Special education teachers lacked the science knowledge, and the discipline teachers lacked understanding of the needs of special students. Some of these grants sponsored by NSF include The New Jersy Institute of Technology, The University of Delaware, New Mexico State Universit and the university of Hawaiiy. EASI has continued helping to disseminate the results of these schools as well. One of EASI's other Internet dissemination tools is the juried e-journal, Information Technology and Disabilities. Three issues of this journal have focused on science access and largely described the NSF grant projects. The journal can be found at http://www.rit.edu/~easi/itd.htm. Relevant material is on the web at http://www.rit.edu/~easi/easisem.htm.

Collaborative Research and Development

EASI is actively cooperating with several other groups. The University of Southern Maine has a Department of Education grant to help train graduate education students nation-wide about adaptive computer technologies and their helpfulness for students with disabilities. Utah State University has a LAAP grant that focuses on training university web designers on how to design web pages to be more accessible. The National Center on Accessible Media at WGBH Boston is working in conjunction with the Massachusetts Institute of Technology to make an online physics video course accessible to students with various disabilities, and EASI is supporting this activity.

Distance Education

EASI has an interest in distance learning. It delivers two online workshops over the Internet. One is on adaptive computing for colleges, and the other is on creating barrier-free web pages. Http://www.rit.edu/~easi/workshop.htm.

Over a decade ago a survey sponsored by NSF found that the major barrier to students with disabilities succeeding in the sciences in school was "negative social attitudes". This continues to be true today. EASI's third NSF grant focuses on the use of Internet multimedia as a dissemination tool. EASI believes that media is a powerful tool for persuasion. It is clear that providing new information and new tools are important, but changing social attitudes and raising social awareness is still basic. EASI has been posting half an hour of fresh audio or video to its web site almost weekly. Hearing a student describe how adaptive technology has changed his learning is powerful. Hearing a researcher describe his motivation and his work is also attention-getting. EASI's uses of media will expand in the next two years.

The other purpose of EASI's media involvement is to demonstrate ways that Internet media can be provided in accessible formats. For the most part this is a matter of thoughtful planning and careful execution. The major hurdle that arises is providing caption text for videos or PowerPoint slide presentations. SMIL (synchronized multimedia integration language) is a tool that permits a media producer to stream video, audio and synchronized captions simultaneously over the Internet. MAGpie is a software program developed by NCAM and the Trace Research and Development Center to facilitate this process. Even with its help, providing Internet captioning is mildly complicated, requires great patience and takes a lot of time. EASI does this regularly and is launching a captioning service for educational institutions. http://www.rit.edu/~easi/captions.htm

Relevant Legislation

Recently several pieces of legislation have come into effect that govern the accessibility of educational curriculum to people with disabilities. This may affect all institutions of higher learning.

In a meeting of distance learning professionals where a high-paid Washington lawyer spoke, the audience became irritated at his lack of specificity. They were worried about the law and its impact on them. They wanted to know how to keep out of trouble. The lawyer then confessed that "no one knows exactly what impact the Americans with Disabilities Act will have on distance learning, and (he) didn't know either." He noted that laws speak in general terms. Court cases and decisions define what those generalities mean for given situations. The audience found this to be little comfort. In this vein, we can refer to legislation and to some court decisions, but each case is unique and no one can guarantee how a judge will rule in a specific situation.

The Vocational Rehabilitation Act (1973) in section 504 specifies that students with disabilities must have equal access to educational programs. This does not specify access to computers as that was almost irrelevant back then. One school recently provided a human reader to read the monitor to a blind student instead of providing adaptive technology access. Many court cases in the last decade strongly insist that access to programs means access to information technology. They also state that equal access does not mean having it inter-mediated through a reader. Now that half of the courses in the

United States integrate the Internet in some way into the class material, access to programs has to involve access to information technology. The Department of Education Office for Civil Rights has stated that providing adaptive technology is similar to providing ramps to buildings.

The Americans with Disabilities Act (1990) has a different focus. It is civil rights legislation. Title II is most frequently invoked especially in public institution cases. One clause that is frequently sited is the need to provide alternative communication "that is as effective as" communication with others. Originally, this applied to oral communication and interpretation for the Deaf. The courts then stated that print is a form of communication and that an alternative to print must be found for students with various print disabilities. The court quickly expanded print to mean digitized information as well. Access to electronic documents and to web pages has been covered in several cases.

Another frequent phrase taken from Title II is "in a timely manner". The courts recognize that providing a textbook and a one-page class memo are different and impose different time frames. In the case of class handouts, the court has stated that means at the same time as handed to other students. For texts the court still wants urgency but will think in terms of a few weeks. However, when school terms only last 10-15 weeks or so, providing a text at the end of a course is not considered timely.

Section 508 of the Vocational Rehabilitation Act was re-authorized in 1998, and its regulations are presently being finalized. This mandates that Federal agencies purchase only equipment, software, and such that is accessible to people with disabilities or which can be readily made accessible. This has shocked many large hardware and software vendors as the Federal government is a significant market. Many are convinced that "Federal agency" has a very broad meaning. It is widely believed that any state accepting funds from the Technology Assistance Act (which includes all of them) will have all of its state agencies included, and some states already have indicated that public universities and colleges will be covered. If so, this will require that web pages be designed according to universal design principles. It will also require universities to create a process to scrutinize its software and hardware purchases.

As was stated in the introduction to this section, each case is different. We cannot guarantee how it would apply to you if a problem arose. We have pointed out the directions in which the winds are blowing. Prevention is always better than a cure. Proper design from the ground up is always better and cheaper than retrofitting.

Conclusion

A pattern that repeats itself throughout the history of technological development is that innovations and accommodations made for people with disabilities benefit many people without disabilities. Technological development motivated by access for people with disabilities has resulted in such critical tools as the telephone, email, and voice recognition. We can take advantage of the emerging/converging environment we find ourselves in to create educational experiences that are inclusive and beneficial to all learners. If we miss this opportunity we may find that as institutions of higher learning we have irreparably widened the digital divide that marginalizes up to 15% of learners and educators who have disabilities.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0011
Title:	Consortial IT Services: Collaborating To Reduce the Pain
Author:	Ed Klonoski
Organization:	Connecticut Distance Learning Consortium
Year:	2000
Abstract:	The Connecticut Distance Learning Consortium provides its 32 members IT services including a portal web site, course management software, course hosting & development, faculty training, help desk, online assessment, and a student financial aid database. The Consortium is a model for expanding learning technologies while containing costs and maintaining effectiveness.

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Consortial IT Services: Collaborating To Reduce the Pain

Ed Klonoski, Executive Director
Connecticut Distance Learning Consortium
New Britain
Connecticut

The Connecticut Distance Learning Consortium provides its 32 members IT services including a portal web site, course management software, course hosting & development, faculty training, help desk, online assessment, and a student financial aid database. The Consortium is a model for expanding learning technologies while containing costs and maintaining effectiveness.

Those of us in higher education working in Information Technologies (IT), all live, in the words of the ancient Chinese curse, in interesting times. The importance of IT services to higher education is rapidly increasing; this means our authority, budget, and staff is growing. But at the same time we are struggling with the problems familiar to our brethren in industry—staffing, maintaining current services, and rolling out new services. But unlike our brethren in the for-profit sector, we struggle to arrange "venture capital" to underwrite dramatic upgrades to our infrastructures. Since most of us work for non-profits, we make arguments for new resources based on increases in efficiency and desperate need.

Now along comes distance learning with a whole new set of IT needs, including many that require personnel. These new opportunities are hard to describe as either an increase in our efficiency or as 'desperate' need. What they represent are classic opportunities for our industry to re-organize and expand its delivery mechanisms and services. In other words, distance education is the sort of innovation that requires re-capitalization for higher education. So the question we face is at least partly financial: How can higher education fund emergent IT services like the new technologies associated with web-based distance learning? However, the question also raises administrative issues. How can we efficiently deliver those services? And what do those services look like? One answer to both the financial and administrative questions that I am proposing is consortial IT services, a 'share the pain' approach.

By "consortial IT," I mean a small organization designed to be collaborative, with the mission and resources to create solutions for emerging IT needs. According to Christensen in "*The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail,*" creating a small, dedicated organization to deal with "disruptive innovation" is one way for an established industry to manage new products with new markets.[1] He argues that such a focused organization can succeed because it will measure itself by the degree to which others adopt its solutions. The success of an IT consortium should arise from its focus, and its attention to the details associated with managing "disruptive innovation." This has been the key to understanding Connecticut's IT consortium.

The Connecticut Distance Learning Consortium

This presentation will describe the IT services, infrastructure, budget and successes of the Connecticut Distance Learning Consortium (CTDLC) in the hope of providing a model for schools looking to expand their learning technologies while containing the costs of development and maintaining pedagogical effectiveness. The talk will detail our services, costs, growth rate, and future plans. The discussion will finish with the advantages to using a consortial approach to IT development.

For three years, the Connecticut Distance Learning Consortium has provided its 32 member institutions IT services including a web site, marketing, course management software, course hosting, course development, faculty training, help desk support, online student assessment, a student financial aid database, and more. These services are supplied to two-year and four-year schools, both public and private. The $2.5 million dollar budget comes mostly from the legislature, as well as fees and services.

In the past academic year the State of Connecticut offered 13 online programs, specifically 325 courses to over 4,000 students. The chart below tracks the growth of distance education in Connecticut over the past three years, and as one might expect, that growth rate has been dramatic. But it is the services that surround web-based learning that have turned out to be the most critical to this growth.

The first Consortial IT challenge was to produce a web site that could serve as Connecticut's hub for all distance education information. What followed from this decision is that Connecticut supports a central web site for student information about programs, courses, registration, etc. that is hosted by the CTDLC. Because such a site was agreed to and produced, the CTDLC has been able to market for all its members using this central site, making the first significant collaboration between the consortial members the joint marketing of their courses and programs. While it is web technology that makes such a venture practical, it the administrative change that such cooperation represents that is most notable. Schools now recognize the need to supply an outside organization with information about their courses and programs.

On the technical front, the CTDLC used the need to deliver course and program information to develop an online database to collect information from visitors that we pass back to our members so they can market directly to these potential students. Here is an example of how a group approach to IT development paid dividends. The CTDLC began advertising the offerings of its members and then developed a sophisticated tracking system to explore the traffic that we were creating. Building our web site led to a technical innovation that serves the whole community. Once the Connecticut General Assembly understood how this worked, they increased our funding for marketing to $150,000 per year.

Our second, simultaneous technical challenge was to create a course delivery infrastructure—servers, course management software, server hosting, technical support, and a help desk for student and faculty. The General Assembly wanted to build such an infrastructure once and let all of higher education share it as needed. We were able to approach these decisions without the added complication of imagining how such system would integrate with existing systems (this occurred three years ago and things have gotten more complicated since then). While no one was forced to use the CTDLC infrastructure, the legislature refused to fund any requests for individual infrastructure from particular systems. The result of this plan is that the CTDLC is able to provide a robust and developing support structure for its partner schools, including such items as a 7-day help desk, learning design, faculty training, and technical support.

From a management perspective, distance learning is the business of the CTDLC, so attention to technical detail and improvement of the infrastructure occurs constantly. In other words, the focus of the organization is on the particular technologies and processes associated with distance learning. The resulting improvements are available to all members, which in theory means that 32 IT departments are not forced to find the resources to address distance learning. This approach had no trouble winning funding from the Connecticut legislature because it means that higher education is working to avoid duplication of services—one of our legislatures criticisms of our industry.

How to Build A Funding Argument For Your Legislature

The argument we used to establish the CTDLC and begin delivering consortial IT went as follows. The emphasis in the IT departments of our member schools is the reliable delivery of established services. It is challenging to provide emergent technologies that require experimentation, user education, and new infrastructures but offer little return on investment. In other words, the new technologies that support distance education are expensive and labor intensive but not financially rewarding, at least at the outset. Providing these emergent technologies is even more difficult because these services are connected with mission critical administrative decisions, require substantial time before they reach enterprise level, and demand new IT skills. For example, new Course Management Systems (CMS) will be used by large number of faculty, so they will quickly become a "routine' part of the higher education computing tool set. In addition, schools that have used them for a while are discovering that they need to link their CMS to the administrative database for purposes of registration, payment, and financial aid. This means that those who are making decisions about "learning technologies" must interface with those responsible for "administrative technologies." This conversation alone is probably aging many of you prematurely.

Our proposal was to develop a consortium to provide wide-ranging access to such technologies as web-accessible databases, online course management software, and distance delivered student services. This approach can share the costs across budgets thereby reducing the start-up price to any single institution, empower wide-ranging experimentation by multiple schools, and concentrate specialized IT skills in a single place.

As higher education confronts the challenges and opportunities provided by the communication revolution, it is exploring the idea of outsourcing some of its activities. Consortial IT is a way of outsourcing developing technologies to a 'vendor' that is operated by the consortial members. In this way, higher education can experiment with unbundling its services while not completely letting go.

The Connecticut Distance Learning Consortium was founded with just such a model in mind. Our first services were faculty training and courseware production. Our startup budget was $30,000 in Sloan Foundation money, $30,000 for our Community College, and human resources from Charter Oak State College. We bought, installed and operated a course delivery system (in our case, we used WebMentor® from Avilar). We hired a server hosting company, bought hardware (one server), a license ($15,000) and went to work.

In year two our legislature created our first budget of $200,000. This grew to $523,000 in the next year and $2.5 million in the current year. These dramatic increases in funding occurred because the Connecticut General Assembly viewed the CTDLC, to use the phrase of Mary Beth Susman, Director of Kentucky Virtual University, as a "utility." Resources could be poured into the CTDLC and services and grants would flow out. Since most state agencies have a budget that reflects the services they are expected to perform (and this includes educational institutions), it is difficult for them to cobble together sufficient dollars to create new services. The CTDLC did not have an historically defined set of services, so in a very real sense, this made the CTDLC an institution where the State could create invest capital.

The Advantages of Consortial IT

Clearly, *the first advantage of Consortial IT is collaborative begging.* Since all schools must approach their legislatures for money, often for projects that seem redundant, asking for common dollars to support a common infrastructure appealed to Connecticut's General Assembly. In other words, the argument that technology, all of which is state-supported for public institutions, should be used to achieve competitive difference between schools is a losing argument. Instead, we argued that technology should be considered part of the playing field and that large difference between schools was evidence of poor management.

Putting the state's distance education resources in one place and letting the entire higher education community—public and private--share in those resources was a winning argument. The idea that a State will make one investment that can be shared by all will strengthen the likelihood of funding. Asking for resources with one voice will also supply evidence that higher education is approaching re-capitalization from the standpoint of state investment in a critical industry rather than individual investments in particular institutions (as familiar as this sort of lobbying may be).

The opportunity for our members to use this technology almost without cost permitted several to begin creating their distance learning programs without worrying about investment. Instead they could concentrate on the hard work of administration—finding faculty, registering students, marketing, etc. The CTDLC underwrote the cost of the infrastructure, but more importantly, it made the software decisions, and incurred the inevitable risk of deciding wrongly. *Here is the second advantage of consortial IT—plausible deniability.* Difficult decisions can be made on an experimental basis without the associated career implications for being wrong or premature.

Teikyo Post University, a small independent college, best illustrates the success of this approach. One year after the creation of the CTDLC they mounted 18 courses for 317 students. Within two years they produced one Associate and five Baccalaureate degrees, and during the 1999-2000 academic year they served 1500 students. As the chart of course offerings reveals (see Appendix A), the growth rate for the entire Consortium was even more dramatic.

A third opportunity created by a consortial approach to IT arrives in the form of experimentation. One of the challenges to IT is the need to create temporary solutions to problems while we wait for the large vendors to create more robust solutions. A case in point: the Connecticut Distance Learning Consortium was chosen as one of 15 participants in the US Department of Education's Demonstration Program in Title IV financial aid for distance students. The existence of the CTDLC made the state a candidate for the program, and the perfect place to solve problems (or meet challenges) concerning inter-institutional registration and distributing financial aid to online students. The CTDLC was already surveying its online students to discover their demographics, expectations, satisfaction, etc. Participants in the Demonstration Program were required by the Department to survey their distance students about some specific questions. The CTDLC saw this as an opportunity to use IT to address a common problem, so using Cold Fusion and Access we designed an automated questionnaire that our Institutional Researcher can collect data and issue reports for the 25 participants in the Program. Even the most technically adept members of the CTDLC were not prepared to address this problem, and they certainly could not produce a solution for 25 different institutions. However, that is exactly what was required and increasingly what distance learning requires of IT.

In addition, this project required us to create an online database to serve as a clearinghouse for tracking student enrollments in multiple institutions. Distance students enroll at a "home" institution but routinely use courses from "host" institutions. We needed to supply a way for the financial aid departments at our schools to track the academic progress of these students because none of the administrative systems—including the National Student Loan Clearinghouse—can do that right now. This illustrates how a consortial approach to IT can delegate small but widely felt problems to an organization with the resources and motivation to develop working solutions. When facing emerging challenges, we must offer services before robust solutions have emerged from large vendors. This is an area that concerns many in IT because such solutions require reallocating resources away from the core services that our departments are charged with supplying.

A fourth area of development is part of the reason I am here today. *A consortial approach to systems development brings together the IT planning folks at multiple institutions and links them to what is developing across the country.* These conversations are driven by the experiments that the consortial entity conducts, which become part of the research and development process for the members. The consortial IT group becomes a skunk works for its members, working with news systems and approaches before they are battletested and sharing the wisdom gained from that pain with the larger membership.

For example, we are currently working with a 12-institution system to develop the Application Programming Interface (API) to connect one Course Management System (BlackBoard) to their Administrative software (SCT Banner). The System's entry into distance education has not been "systematic." Instead, schools have individually developed capacity at different rates, using a variety of course management systems (including those of the CTDLC), and without much thought to integrating those systems into their administrative software. The problem is potentially huge, and the need to address it is pressing. But the System is distracted by the effort it takes to finish the implementation of their administrative software, and the schools do not have much voice in system-wide IT decisions. The CTDLC is taking the initiative—and the risk—of building a pilot solution to demonstrate how this process can work.

In the process we are collecting information about how this is being handled in other places, what the choices involve, and what the price is (financial and administrative). We are making purchases, mounting the learning curve, and sharing our hard won wisdom. Our work increases our value as a partner while it grows our expertise, so the project is a "win-win" for both the System and the CTDLC.

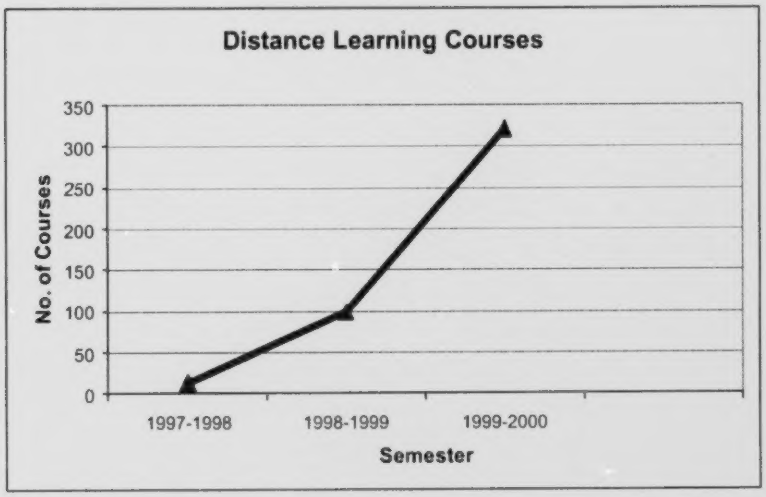
Conclusion

In conclusion, the need for IT services in higher education continues to grow, and the cost for these services also continues to increase. Established IT departments are struggling to address emerging issues created by distance education because these problems often require "customized" solutions, administrative changes, venture capital, and even mission changes. To add to the difficulty, the new economy is challenging higher education to "unbundle" its services, and IT is being asked to play a role in the deployment of new services, the reorganization of a beloved delivery system, and the unbundling of services that have never been outsourced. Consortial IT is a method for managing the expense, risks and creativity such challenges represent. Banding together to manage the change process will be seen as a positive step by state legislatures, and it will certainly represent a field trial of the sort of collaboration that is driving the New Economy. The resulting consortial organization will have the resources and mission that empowers it to create and disseminate solutions.

Endnotes

[1] Christensen, Clayton. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail.* Boston: Harvard Business School Press, 1997.

Appendix A


Distance Learning Courses
No. of Courses
350
300
250
200
150
100
50
0
1997-1998
1998-1999
1999-2000
Semester

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0010

Title: Crossing the James: A Model for Distributed Learning in the Virginia Community College System

Author: Lawrence J. Hengehold and Carole Schultz

Organization: Virginia Community College System Office

Year: 2000

Abstract: The Virginia Community College System has developed a model for distributed learning that assures round-the-clock access and support, leverages the resources of 23 institutions, and retains the pedagogical integrity of courseware. Presenters will detail this model, addressing cost-effective and efficient development of content, content delivery, and the technical and academic infrastructure to support faculty endeavors and student success in a distributed learning environment.

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"Crossing the James River"
Infrastructure for Distance Education

Larry Hengehold
Carole Schultz
Virginia Community College System
Richmond
Virginia

The Virginia Community College System has developed a model for distributed learning that addresses 24 x 7 access and support, leverages the resources of 23 institutions, and retains the pedagogical integrity of courseware. The model, a four-pronged approach, addresses the Technology Infrastructure, Portals, Content, Delivery. The systematic approach allows us to maintain some balance in both effort and resource allocation and it allows to see gaps that will prevent the VCCS colleges from moving forward with technology-based instruction. Coupled with the energy, enthusiasm and capacity of the VCCS colleges, we are building a model for an e-learning environment.

"Crossing the James River"
Infrastructure for Distance Education
(http://www.vccs.cc.va.us/its/resources/)

August 2000

Larry Hengehold, Vice Chancellor for Information Technology, Virginia Community College System (lhengehold@vccs.cc.va.us)

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When the first waves of settlers landed in Virginia on the James River they had to (ad hoc) construct canoes and rafts to cross the James River. Later on, the next waves of settlers were able to build upon the experience of the early settlers and obtain passage (scheduled batches) on ferries across the James. Eventually bridges were built and the succeeding waves of settlers could cross the James anytime (just in time). The same scenario is true for the distance education. Early pioneers had to build everything themselves. The second waves found software packages that invited them to build courses in batches due to the long development time. The third wave of distance education will permit "just in time" construction of a course or program. To achieve this level of maturity will require an organized and well-conceived infrastructure from both a technology and organization perspective. Essentially it will "change the way higher education works".

The Virginia Community College System is developing a four-pronged approach to distance learning. The twenty-three colleges are heavily involved in developing and delivering technology-based instruction. Over the past 4 years, there has been continued growth in both course offerings and in student enrollments. In 1999 – 2000, over 28,000 students accounted for 39,000 enrollments, up over 35% from the previous year. Approximately one half of Virginia's community colleges offer degree or certificate programs online or via videoconferencing.

At the same time, the infrastructure supporting technology-based instruction in both classroom delivery and in distance delivery has developed at a rapid pace. While great progress has been made across the system, VCCS is feeling the pressures of the e-learning environment – increased demand for degrees and certificates online, keeping faculty up to speed on new technologies, providing 24x7 support, rapid pace of new technologies, new competitors, new partnerships, cost of software licenses, the global nature of online instruction. We are facing an ever-moving target with the rules changing everyday. It is no longer business as usual. To address the many issues that we already know and those that may arise in the future, the VCCS is using a systematic approach to technology-based instruction.

Technology Infrastructure

The Virginia Community Colleges have a balanced mission driven information technology initiative. The strategy is to be an early adopter of new mainstream technology so the colleges can stay in front of their customers who will expect courses to be provided. College applications are organized and network centric in nature. In 1996 a statewide broadband network was created that supported data and video classroom transmission. Over the years network applications have grown to include voice over IP (instate long distance), audio conferencing, video over IP (desktop video), classroom and conference video, and several types of streaming video. Virginia's community colleges have adopted the "message broker" middleware concept and used it to integrate security, email, SIS, library access, etc. This technology is also used for SIS data conversion, application integration, and other network based applications.

All 23 colleges share a "Utility" service (ASP – Application Service Provider), which provides the network operation center, customer support center, and applications support center. The Utility provides the back room services and knowledge required to provide a three-tiered infrastructure. This service offers a cost effective approach and a core competency for the Virginia Community College System. Each college is responsible for the first tier of support related to each campus.

Applications are grouped within five "information systems" which are General Office, Student Information System, Financial and Human Resource Information Systems, Management Information Systems, and Instructional Information Systems.

The college administrative processes have undergone reengineering and deployment is underway. The student services applications use PeopleSoft and their web-based technology to support faculty and student access. Financial applications reengineering is also underway and is based upon the PeopleSoft web based applications. Human Resources will follow the Financial applications. All of these are reengineered with an eye on distance education and its demand on the administrative infrastructure.

Like the other information systems groups, Instructional Information Systems has several components such as customer relation management, intellectual property management, academic subject content management, and instructional delivery methodology. The administrative infrastructure definition is the discussion for the remaining portion of this paper.

Portals
VCCSOnline

Distance learning courses offered by the VCCS colleges are listed on VCCSOnline (http://www.so.cc.va.us/vccsonline/index.html). It has been the most heavily hit web site since it was launched over a year ago – 97,000 hits per month representing 22% of the traffic on the site. There are over 1700 distance learning courses listed. A recent enhancement is the electronic postcard which students can use to request information on courses. Once students find the course they are interested in, they can click on "find more information" and send an electronic postcard requesting more information on the course or on distance learning in general. A contact at each college receives the postcard and responds or directs it to the appropriate person on campus. As we analyze the student inquiries, we will enhance the web site to address student needs.

Concern for student success in e-learning drove the development of a student orientation course. The course template was built on Blackboard and is being customized by several of the colleges for their use. The course will provide students with hands-on experiences as well as tips on learning in the virtual classroom.

Other learning resources and services are being developed to support students engaged in technology-based instruction. This "portal" will eventually be part of an integrated portal for distance learning.

Content

A key element in all of technology-based learning is the amount and variety of content. Courses will be comprised of multiple resources that come from multiple sources – digital content libraries, commercial publishers, and other producers. A faculty member will no longer be the sole creator or deliverer of all the content used in a course. Another likely track is that courses will become modular and will be pieced together to form courses and programs. Modular content will also lead to customized learning opportunities.

Online digital learning centers will be created to support one or more discipline areas. The learning centers will provide the academic support services for students and faculty. For students, there will be activities directly related to the content, supplemental resources to assist students who need both tutorial activities and enrichment opportunities. Faculty will have access to resources for use in their courses. Both faculty and students will have more options on presenting and learning content.

Several activities are underway to provide opportunities for faculty engaged in creating and delivering technology-based instruction. A Courseware Grant Program (http://www.so.cc.va.us/vccsit/CwareRFP5.htm) that supports collaborative course development activities has resulted in over 100 technology-based courses. The basis for learning centers has been established through the development of the Virtual Foreign Language Web Site (http://www.nv.cc.va.us/vflc/) the Faculty Online Resource Site (http://164.106.217.32/frs/index.htm) , an online math center. These resources, along with the development of a student orientation to distance learning will enrich the virtual learning environment.

The VCCS is participating in the MERLOT (Merlot.org) project. Faculty will be trained in identifying and evaluating electronic resources for use in the classroom or for distance learning activities. The MERLOT faculty will disseminate what they have learned to faculty across the VCCS Colleges. One natural by-product of the Merlot activity is that faculty will evaluate their own electronic materials more effectively. Another outcome is that faculty will gain experience in building courses from a variety of building blocks. Faculty will be more astute at selecting and using content for e-learning activities.

VIVA, the Virtual Library of Virginia (http://www.viva.lib.va.us/), supports technology-based instruction through a variety of electronic resources.

Course development systems are in use in the VCCS. As these, and other tools, become more sophisticated, faculty will be able to compose learning experiences for a variety of settings and to meet the needs of differing learning styles.

Delivery of content/services – a "what" and "how" issue

There are several approaches to content delivery being evaluated in the VCCS. The strategy is to move toward a concept of Commonwealth courses and programs (in the broadest sense) delivered by VCCS colleges. While there is evidence of this concept in the distance learning programs currently being offered – Veterinary Technology, Dental Hygiene, Respiratory Therapy – we need to continue to scale up so that these high demand, highly specialized programs are available throughout Virginia. A committee is looking at the issue of distance learning program delivery. They will recommend a model for program delivery starting with Information Technology. The key issue is how to increase access for students to specialized and/or high demand programs. We will have to find creative and innovative ways to use technology to deliver content and services and we will have to look at our existing structures and practices to determine what we need to change. We will have to address the difficult question: "How can we provide technology based instruction without changing what we do now?"

The way content is delivered will be driven by both the demands of the market and the availability and variety of digital content. Faculty will be able to deliver content for both traditional degree programs and workforce development activities. The careers of the 21st Century will require continuous learning and relearning. An array of content resources will allow faculty to customize courses and programs as needed.

This is the area where will activities will become unbundled. In many instances, faculty will be part of an instructional team. Once content is readily available, faculty will have great flexibility in packaging instruction. While electronic content supports flexible delivery options, administrative issues often present obstacles. Faculty workload and compensation are based on seat time and fixed schedules. It is likely that this area will be impacted by external forces rather than internal changes. Beyond the administrative issues, the role of faculty is changing because of e-learning. Faculty/student interaction increases and instruction can be directed toward individual needs and abilities.

One approach to course delivery in a virtual setting is the VCCS Virtual Foreign Language Classroom. A foreign language faculty member coordinates the delivery of foreign languages across the system. This year 8 (French, Spanish, German, Russian, Chinese, Japanese, Arabic and Latin) languages are available to the VCCS colleges. Enrollment for the Fall semester is over 300. A faculty member is developing a virtual math lab to support students and faculty in math and related subject areas. Nursing faculty are developing a web-based program that will allow EMT's and military corpsmen to obtain a nursing degree. All of these initiatives involve "change" in the way we do things.

Another element anticipated to support delivery of content is an engine that will manage/coordinate all of the resources and learning events for faculty and students. The objective is to have a seamless, transparent infrastructure for faculty and students. The "engine" will be an important component of a sophisticated learning environment that provides customized learning opportunities for students.

The strategy is to "scale up" program delivery through better use of technology, new delivery strategies (unbundling the content and delivery processes), more content options, improved assessment methods, and creative partnerships.

It is obvious that we will have to step out of the "business as usual" concept. We will have to change the way we do things, invent new approaches to providing instruction and services, and remove the restrictions imposed by a time/place based educational system.

At this time, the delivery of content is the area that has changed the least in some respects but it is the area that will feel the greatest impact of e-learning. E-learning will cause us to examine the very heart of the institution and relationships with faculty. It is likely that content and instructional services will be delivered by teams – faculty, tutors, technical staff, and other support personnel. Faculty will have opportunities to co-teach or team teach where they may play very specific roles rather than sole provider. It is not a question of if change will take place but rather "how" and "when".

Instructional services may be provided differently than they are now. Institutions may turn to other agencies to provide some services. Institutions may partner with each other to provide services in support of the e-learner. Testing, tutorial services, management of clinical activities, technical support, portals are some of the areas where institutions may consider alternative methods of delivering services. Credit banks and agencies that evaluate non-credit instruction for application to credit programs will appear in greater numbers. The possibilities for innovative and creative ways to support the e-learner will increase.

E-learning has forced accrediting agencies to re-think their guidelines. Regional boundaries fall as e-learning takes on a global perspective. Questions arise on what gets accredited – institutions, faculty, students. The question of quality and integrity of technology-based instructional programs will remain an issue for providers and students.

Summary

The virtual learning environment appears to be fragmented and even chaotic. There are more questions than answers. We have chosen a systematic approach so that we can begin to piece the learning environment together and keep the four areas we have identified – infrastructure, portals, content and delivery -- in relative alignment. The virtual environment is multi-dimensional and complex. The systematic approach allows us to maintain some balance in both effort and resource allocation and it allows to see gaps that will prevent the VCCS colleges from moving forward with technology-based instruction. Coupled with the energy, enthusiasm and capacity of the VCCS colleges, we are building a model for an e-learning environment.

Appendix A

Virginia Community College System
Distance Learning Infrastructure

Technology Infrastructure Internet 2 VOIP – voice & video Video conferencing Streaming video Message broker Student Information System Utility – ASP Instructional Information System	**Content** **Courseware grants** Virtual Foreign Language Classroom Faculty Online Resource Software libraries -- NetG VIVA (virtual library) IP Policy Professional Development Program New Horizons Conference Course management Systems – BB, WebCt MERLOT Microsoft mentors
Portal VCCSOnline — course database Student Orientation Electronic postcard Virtual Foreign Language Classroom *Online Math Center *Discipline specific online centers	**Delivery** Quality Assurance DL Action Plan College Technology Plans Administrative Procedures Accreditation Funding base Faculty issues Workload Intellectual property *Co-teaching *Instructional teams *Modular instruction *Continuous enrollment *Fee structure DL Program Committee

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Transforming Education Through Information Technologies

Abstract

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ID Number: EDU0071

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Author: Robert B. Kvavik

Organization: University of Minnesota

Year: 2000

Abstract: E-commerce brings new opportunities to greatly improve the efficiency and effectiveness of university services. Traditional business strategies and service delivery models need to be redesigned in order to make e-commerce successful in capturing the imagination and loyalty of students, faculty, and staff. A demonstration and case study about UM's use of new and emerging e-commerce applications is featured, identifying the opportunities for, barriers to, and measurable costs and benefits of implementation.

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Transforming Education Through Information Technologies

Abstract

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ID Number:	EDU0027
Title:	Integrating Information, Education and Technology Services
Author:	Linda O'Brien and Peter Sidorko
Organization:	University of Newcastle
Year:	2000
Abstract:	The higher education environment is undergoing significant change as we enter a global knowledge-based economy. Technology now enables students to undertake studies which are time and place independent. To thrive in a networked learner environment we must create new strategic relationships between library and information professionals, information and education technologists, trainers and staff developers, instructional designers and media designers and producers. The University of Newcastle sought strategic advantage through integrating its information, education and technology services in early 1997. This paper explores the rationale for the formation of the division and the strengths and weaknesses of this approach as highlighted through our recent external review.

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Integrating Information, Education and Technology Services

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Australia

The higher education environment is undergoing significant change as we enter a global knowledge-based economy. Technology now enables students to undertake studies which are time and place independent. To thrive in a networked learner environment we must create new strategic relationships between library and information professionals, information and education technologists, trainers and staff developers, instructional designers and media designers and producers. The University of Newcastle sought strategic advantage through integrating its information, education and technology services in early 1997. This paper explores the rationale for the formation of the Division and the strengths and weaknesses of this approach as highlighted through our recent external review.

Introduction

"The universities of the world have entered a time of disquieting turmoil that has no end in sight."[i] Throughout the world the higher education environment is undergoing transformational change in response to the globalization of the economy, emergence of the postindustrial economy, the decline of the welfare state, the commodification of knowledge and technological advances which enable unprecedented innovation[ii]. Information technology is providing new learning opportunities which transcend boundaries of space, place and time enabling global competition, not only from other universities throughout the world, but from non-traditional competitors. At the same time our students', the employers' and government's expectations of service and demand for quality are increasing. Universities can no longer assume they have an exclusive franchise on enrolment of students from a particular geographic area nor can they ignore the opportunities for change in pedagogical method offered by technology. Whilst it is unclear which mode or modes of learning will dominate in the future any university which is not preparing for change and exploring options will risk creeping obsolescence[iii]. Richard Katz[iv] similarly notes that "institutions that can step up to transformational change will stand a better chance of surviving".

Mark Luker, Vice President of EDUCAUSE, noted that "The fact that our [universities] primary stock-in-trade is knowledge suggest that embracing the new tools of networked information technology should dramatically transform and improve our effectiveness as an industry. At the same time, however, we know that this can occur only after we make substantial changes to the design and operation of longtime structures and methods. In other words, we know we must transform higher education."[v] In 1996 Professor John Hay[vi], a prominent Australian Vice-Chancellor, urged universities to recognize the problems caused through 'fractionating' their budgets along traditional structural lines and, more importantly, noted the tyranny of regarding the library and information technology infrastructure as 'extra' to the academic process rather than integral components of this process.

Whilst the synergies between libraries and information technology divisions have been well recognized it has only been more recently, with the spread of the Internet and multimedia capability, that the need for close integration between the teaching and learning process and the information and information technology infrastructure has been noted.

The University of Newcastle is a comprehensive, research intensive, public Australian university. It is situated just north of Sydney on the east coast of Australia and is considered middle-sized by Australian standards with just under 20,000 students. Ranked in the top ten research income earning universities within Australia, and with a predominantly on-campus undergraduate and post graduate research student population, it exhibited a culture much like that of an Australian 'sandstone university', or what Americans would call the 'Ivy league'. It had been slow to respond, perhaps even resistant, to the challenges being raised through the impact of technological change. But in 1997 this was to change as the University sought to strategically position itself 'ahead of the game' in higher education through organizational change which integrated its information, education and technology services. This paper explores this process of change, examines how far we have progressed - the extent to which we have realized the benefits anticipated, and if not why not, and the strengths, weaknesses and lessons learned from such an integrated approach.

The Context

In 1996 the Vice Chancellor and President, who was relatively new to the institution, indicated that he was interested in structural change integrating library and information technology services, as he had positive experiences from such structures elsewhere. Change was being foreshadowed.

Barrett[vii] suggests several ways in which you can respond to change ranging from 'coping with change to survive' through to 'creating change to triumph'. The University Librarian, the Director of the Centre of Learning and Teaching and the Director, Information Technology at the University of Newcastle decided to adopt Barrett's last strategy: 'to create change to triumph', so we set about developing a discussion paper and recommendations for the Vice

Chancellor and his executive. We described the environment in which the University would operate over the next five years as characterized by:

- 'competition in a global knowledge economy, with non traditional competitors entering the market
- increasing reliance on non-government sources of income
- reduced regulation within the Australian higher education sector
- an increasing requirement to produce, deliver and distribute information without constraints of time or distance
- changing work places requiring transferable skills
- continuing development and increasing pervasiveness of information and communication technologies which will transform teaching and learning
- an expectation of continuous quality improvement based on monitoring and evaluation followed by reappraisal of plans and services
- a necessity to develop partnerships and strategic alliances in order to thrive in a changing environment
- an emphasis on 'learning' rather than 'teaching' and the student as the 'customer'
- many opportunities for universities to augment their income through universal access to their expertise.'[viii]

We noted that the tertiary education environment was undergoing significant change as technology enabled students to undertake studies which are time and place independent. We were moving into a highly competitive global knowledge economy where information technology is a strategic differentiator and where our students increasingly expect high quality, flexible information and education services without the constraints of time or distance. To strategically respond to these changes and position the university for a networked learner future we argued that we must put in place appropriate plans, policies, strategies, structures and culture. We needed to create new strategic relationships between library and information professionals, information and education technologists, trainers and staff developers, instructional designers and media designers and producers if we were to thrive in a networked learner environment.

We recommended that a new Division be formed to bring together the University Libraries, the Centre for the Advancement of Learning and Teaching, the Information Technology Division, the Medical Communication Unit and Classroom and Theatre Services. We believed that the formation of the Division would maximize the following benefits:

- 'provide an integrated approach to developing goals and plans for the delivery of flexible learning, information and technology services

- position the University to exploit information technology to strategic advantage to offer more flexible courses, regionally, nationally and internationally and to re-package modules as fee-based programs

- provide the framework from which to pursue new opportunities by bringing together staff with the relevant skills and knowledge - curriculum designers, information professionals and information technology professionals

- ensure budget flexibility to redeploy resources where most needed to achieve the University's goals and plans

- provide opportunities to re-skill staff as technology transforms their work

- provide opportunities for research to be undertaken into the application of technology in the teaching, learning, research and administrative processes with a division which combines academics and information and technology professionals

- ensure better access to the necessary infrastructure to support teaching and learning

- provide strong academic links into the faculties, ensuring the division is academically focussed and responsive
- minimize the risk of duplication of effort and resources, leading to efficiency gains."[ix]

The Information and Education Services Division

The formation of the Division was endorsed by the University Council in April 1997. This was seen as an innovative response to the context in which the University must operate. The Division underwent a change management process to develop a new mission, goals and structure which sought strategic change, ie. innovation. During the change process staff within the Division developed a shared understanding of the plans and scope of services offered by the existing units which form the Division and of the rationale for the formation of the new Division. Together we created a mission statement and goals for the new Division, structural principles and a new structure based upon these principles. By January 1998 the Division had the top level structures and some of the internal structures in place. These continued to evolve over the remainder of 1998 and into early 1999.

The Division's Programs

The success of the Division revolves around the opportunities for strategic collaboration that are made available. Failure to maximize on collaborative efforts will diminish the likelihood of the Division achieving the benefits that were foreshadowed prior to its inception. Notwithstanding this, each of the Division's Programs has well-defined functions which are described below.

Client Services Program

The Client Services Program provides information and technology services to support both staff and students. These frontline services include the Help Desks, and converged IT Help Desks and library Reference Desks (locally referred to as Information Desks) in all of the libraries. Other functions include information resource and collection development services, faculty librarian support services, Information Technology (IT) desktop support, and management of the computer laboratories.

Information Resources Program

The Information Resources Program is responsible for the development and provision of scholarly information resources for staff and students. Among its services are acquisition of books and other information media, cataloguing and technical processing, and serials processing. This Program also manages interlibrary loans and document delivery, book circulation and Short Loans, archive collection and maintenance, and special collection and rare book services.

Information Systems Program

The Information Systems Program carries responsibility for the development, maintenance and integration of the University's corporate information systems, including student, human resource management and financial systems. Program staff also develop and maintain systems and interfaces to provide access to information contained in the corporate information systems.

IT Infrastructure Program

The IT Infrastructure Program manages the arteries conveying information and communication services across all campuses and outposts of the University. These functions include the large scale ones of telecommunications, core communications infrastructure development and maintenance, and hardware and operating systems management. The Program also provides audio-visual services in theatres and classrooms, and technical support to computer laboratories and library computers.

Learning and Development Program

The Learning and Development Program offers courses and consultancy in most areas of staff and organizational development, and has particular expertise in teaching and learning and information technology. The Program houses PROBLARC, a specialist consultancy in Problem-Based Learning which operates worldwide.

Media Design, Production and Publications Program
This Program offers a wide diversity of specialized design and production services. These include graphic design and desktop publishing, video production and photography, and multimedia and CD-ROM productions. It also supports production and use of Powerpoint and other computer-based presentations, transparencies and slides, and Web-based media. Technical support is also given to conferences, and the Program has a strong expertise in medical media.

Web Development Team
The Web Development Team coordinates the University's web site, ranging from the production of promotional material to the delivery of student course material via the Internet. They provide technical advice, assistance with maintaining corporate standards on the web and provide leadership in the use of new Internet technologies.

Surveys and Evaluation Services
This unit offers survey design, statistical and analytical services for individual, departmental, institution-wide or external project needs. The unit manages the University's standard Student Evaluation of Subjects, and Student Evaluation of Teaching, the Composite Student Questionnaire and a wide range of other surveys on request. Staff can design and administer surveys, analyze data and produce reports. Advice and support on statistical software is also available.

Management of the Division

The Division is led by the Executive Director who convenes fortnightly Management Meetings which bring together the managers from each of the Programs mentioned above. This forum provides the basic structure upon which collaborative efforts are built. Members of the group share their Program's management plans and their own individual performance goals enabling a transparent and consistent approach to planning. The group analyses key strategic directions for the Division as well as assesses projects, both proposed and in progress.

In 1999 the Division was reviewed by an external panel of experts. Prior to this we were required to undertake a thorough internal review and many of the findings from this internal review were confirmed by the external panel. We found that that the Division had already moved a significant way toward achieving the benefits sought from its creation. Yet we recognized that we could achieve even more.

Achievements

1. An integrated approach to planning and management of the information, education and technology services

The Division has achieved an integrated approach to planning and management of the information, education and technology services within the context of the University's strategic directions. These plans are well integrated with, and underpin, the University's Strategic Plan. Integrated approaches to planning were exemplified through the IT Infrastructure Development Planning process and the flexible learning[x] project initiatives.

Planning the development of the University's IT infrastructure is an iterative process involving consultation with all Faculties and Divisions. This was strengthened by having greater involvement of information and education professionals from within the Division in the planning and development process. Through this a stronger emphasis was placed on the development and enhancement of infrastructure to support teaching and learning.

The University's strategic plan identified development of more flexible approaches to teaching and learning as a key priority. Appropriate experts from within the Division worked closely with the University teaching committees to develop policies and plans to enhance the University's approach to flexible learning[xi].

2. Increased flexibility and ability to pursue new opportunities and to respond to changing university demands and strategic initiatives

The Division is in some senses working at the 'frontier' in that its services and operations must be continually reviewed as technology offers new opportunities. It is essential that the Division retain the flexibility to be innovative and adaptable. The Division seeks to respond to changes in the University's strategic directions and to grasp opportunities offered through changes in technology and through strategic partnerships. There is considerable collaboration between the Division and other organizational units within the University and with external agencies for mutual benefit.

Some examples which demonstrate this adaptability and flexibility include:

- Establishment of the learning consultants team
  To respond to the University's strategic directions with respect to flexible learning the Division sought to establish a team of learning consultants with expertise in curriculum and instructional design, media production skills, information and IT skills. This team, including both academic and general staff, provides consultancy services and project management for the University's flexible learning projects.
- Establishment of the web team
  The Division created a web team early in 1998 as a separate organizational unit. The Division was conscious of the need for a flexible and focused group which could embrace this new technology and work with other areas both within the Division and across the University, in exploiting the potential for the Web to position Newcastle in terms of teaching and learning practice, information resources and information and administrative systems.
- Staff development
  By locating the staff development function within the Division this ensures that staff and organizational development is informed by, and responsive to, teaching and learning developments and to information system and technology changes. In effect it places key decisions as to the critical content and focus of staff development within organizational proximity to those areas actually experiencing the changes in technology or practice, ensuring that staff development is linked to organizational change.
- Increased electronic access to scholarly information to meet teaching and learning needs in a flexible way
  To support flexible, problem based learning the Division has taken advantage of recent developments in electronic scholarly publishing to vastly expand the resource base of the Library's core collection of information resources and to provide the flexible and remote access to a quality research level information resource base. We have been able to plan such developments within the context of the University's overall systems development plans and capabilities.

3. Providing an integrated seamless approach to service, bringing together a range of relevant professionals on a project basis when required

The Division continues to offer a comprehensive range of services, with the ability to provide an integrated seamless approach to service, bringing together a range of relevant professionals on a project basis when required. The Division is far more than the 'sum of its parts'. It brings together staff to achieve a common purpose in a way which values the unique strengths of each of the professional groups within the Division. Through the use of cross-Divisional working parties, 'virtual team' meetings where staff servicing a particular client group meet to share ideas, State of the Division meetings and other strategies we are seeking to form new partnership which bring together our unique knowledge, skills and abilities to achieve a common purpose. We believe we can, and are, achieving far more than we could as independent units.

Perhaps the most notable example of our integrated approach to service is through our information desks and call center. The Division now manages integrated service points within the University libraries. The Libraries contain a number of computing labs and students have a 'one stop' information service point to assist them. By integrating these services we were able to extend opening hours, improve the services available and reduce costs. The first service point to be integrated in this way, Huxley Library in 1997, saw almost a doubling of the number of students and staff entering the library when 1998 figures were compared with 1997.

In 1999 the Division implemented a call tracking software package. The software enables the tracking of all IT support call requests and provides a sophisticated mechanism for producing reports. This project was managed by our Service Point and Quality Assurance Team Leader, a librarian, and included IT professionals from the desktop support, labs management and infrastructure areas. While the project manager had only recently been exposed to IT management, the project was successfully completed on time.

As has been already noted, the Division manages a number of general access and training computer laboratories. The management of these laboratories is coordinated through the Labs Management Group, a diverse group from several Programs of the Division including Client Services (both IT and Library professionals), Infrastructure and Learning and Development. This group meets fortnightly and enables a consistent approach to computer laboratory management and support across the domain of the Division.

The opportunities for collaboration by bringing together a range of relevant professionals on a project basis has also contributed to the greater understanding that professional groups now have for each other. Several instances, in fact, have provided staff with the opportunity to develop new skills and to change professional directions. There are several examples in the Division where individuals have re-directed their careers on the basis of the opportunities that have been available.

4. Creating a planning and budgeting process to regularly re-assesses priorities and the 'bundle' of services we offer so we best meet the university's priorities, changes in demand and new service options

To realize the budget flexibility to re-deploy resources where most needed to achieve the University's goals the Division has embarked upon an iterative planning and budgeting process to support the University's strategic planning process. Each Program has a three to five year management plan which is revised annually (the University requires a five year budget plan). The plan is informed by the Division's strategic directions and the University's Strategic Plan. The Management Plans are used to develop staffing profiles, income targets and budgets for each Program on a rolling annual basis. Through negotiation the management team agrees on all the plans and budgets. This ensures that the Division continuously re-deploys resources, both human and financial, to best meet the University's strategic directions.

Another mechanism we employ is the use of service level agreements. We have witnessed an increase in demand across all areas of the Division's services, be it support for teaching and learning, library or computing services. The Division is seeking to meet changing priorities but must manage these within a fixed resource base. The Division has historically been funded to provide desktop support services to the University's administrative Divisions while the Faculties made their own arrangements. Several years ago the Division offered Faculties an opportunity to purchase these services from the Division at cost, believing this provided the University with the most cost effective service option. Faculties could choose to employ staff, contract out services or purchase services from the Division. We now have the majority of faculties in some form of SLA and we are planning to extend the agreement to cover all services offered by the Division to better ensure our resources are targeted to client needs.

5. Linking budgets to plans and finding efficiency gains to manage increased service demands, both for existing and for new services, within a declining budget

The Division has been able to create new services and manage increased service demands within a fixed Division budget by better linking of our plans and budgets. The range of services provided by the Division, and the terms and conditions under which these are provided, have evolved over time whilst the Division's operating grant has been essentially static. As technology transforms the services we may offer, and the way in which we may offer them (for example self service loans and renewals), it is critical that the Division constantly reviews the bundle of services it provides and the terms and conditions under which these are provided. This is important given that the University must continually respond to external pressures, changes and opportunities within both the immediate and global environments. The primary mechanism has been through changing our staffing profile by changing the way in which the Division's funds are allocated to better support the University's strategic directions. Specifically we have sought to:

- find efficiencies wherever possible
- re-define services to enable us to shift resources as required
- make smart use of information technology
- exploit the synergies and opportunities provided by the formation of the Division.

To illustrate this the following summary shows some of the ways in which the Division has responded within its existing resource base:

- development and maintenance of a University web site (began in 1998)
- workshops in flexible learning techniques and technologies (began in 1998)
- flexible learning consultancy services (began in 1998)
- Student Evaluation of Subjects and Student Evaluation of Teaching (established as operating grant funded activity in 1999 though previously existing under special grant funding)
- implement library self service strategies to reduce our staff costs. For example self loans now account for 60% of all loans
- increase the hours of library opening under study hall conditions.

Given the size of the Division, the different cultures we were bringing together and the requirements to continue to do more with less, we have achieved a great deal. Within a few years we have integrated our planning processes to great advantage, resources are being deployed where they are most needed to achieve the University's strategic aims, and our staff now identify themselves with the Division whilst retaining a commitment to their particular service function and to their clients. Like any change processes it has meant that energy was taken in 'self reflection'. This has been a worthwhile investment but not without its challenges and its pitfalls.

Challenges and pitfalls

Client expectations – both internal (to your organizational unit) and external

With the formation of the new Division came raised client expectations. The Division promised new opportunities and it appeared to have 'lots of money' and 'lots of staff' when in fact there was no increase in resources and all existing services were to continue. If the Division is to operate strategically and capitalize on these new opportunities it must constantly review its service profiles within the context of the University's plans. But at the same time we must provide some certainty for our clients. Such an approach is not without tension. The Division brought together units which may be regarded as service units yet through its formation it has sought to provide leadership within the University in its areas of expertise. The Division structured itself so that it had the flexibility to evolve in line with the rapid changes and new opportunities offered by changes in technology. Yet at the same time the Division must provide client-focused services. This can create tensions between leadership and service which must be carefully managed. It is therefore critical that client and stakeholder expectations are effectively managed in an ongoing way.

It is also critical that you have agreed service levels and consistent service quality across all services and projects that you provide and to achieve this you must have agreed internal service levels so that your units within each share a common understanding of priorities and deadlines.

Client and stakeholder awareness of service demands/expectations

The Division is trying to ensure, through a range of strategies, that it uses its resources in the most effective way to meet University strategic directions. We have accommodated significant increases in service range and demand within a relatively static resource base through improved work practices, reduction in duplication of effort, better use of technology and economies of scale. But what must be noted is that we are moving resources around within a defined 'envelope'. It is critical that we educate the university executive to the fact that you cannot continue indefinitely manage increased demand with static/reduced resources by re-deploying resources. The reality is that most areas within the Division are growth areas for student and staff demand and technology isn't necessarily replacing demand for traditional services (eg. book loans have increased over this period despite having greater numbers of electronic information services). At some point the University must make choices about its priorities.

University community understanding of how technology is changing the business of education and their readiness for change

You cannot assume the University community understands how technology is changing the business of education. The pace of change in all aspects of the University's business will not abate, with effects that question the traditional roles of universities and academics. The future consequences of continuing change can only be largely unknown. Whilst the Division is well aware of the drivers of change and constantly seeks to re-position itself within the changing technological environment, it is easy to forget that many within the University are not aware of these changes, and in many cases are not ready for, or resistant to, such change.

Internal complacency

With the formation of the Division staff within have been subject to significant change, not only in structures but, in many cases, in the design of their jobs and in the skills, knowledge and aptitudes required of them. You need to help them realize the 'restructure' is never finished. If we are to seek continuous improvement we must be prepared to keep making changes to improve what we do. You must work to develop a culture that welcomes change as an opportunity rather than a threat.

Also you must be prepared to continue to take risks and to sometimes make mistakes. Innovation can only occur when it is OK for staff to try new things and to know that if, as they sometimes do, these fail, you will not be persecuted for this.

You must be prepared to continue to model the organizational behavior you wish to see in other parts of your university even when you think you aren't making an impression. The Division is working hard to model effective organizational behavior, such as linking resources to plans and therefore making choices about priorities, building partnerships, managing staff performance and facilitating organizational learning. Even when you feel that others are not 'playing by the same rules' you should not compromise your approach but continue to model the behavior you would like to see in others.

Conclusion

While the Division has only existed for less than three years, it has realized significant achievements which reflect the benefits that were anticipated prior to its formation. Several of the challenges and pitfalls we have identified have led us to review some of our earlier strategies. These challenges and pitfalls, coupled with recommendations from our external review, have provided the Division with the impetus to seek to continually improve its services to ensure that we maximize our achievements and our value to the University community.

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[x] Flexible learning is defined as flexibility of choice for learners, with that choice exercised with respect to movement between courses and institutions, content, mode of delivery, and entry and exit.

[xi] See for example the Issues paper prepared by Dr John Drinan, Deputy Director IESD, for the University's Teaching and Learning Committee at http://www.newcastle.edu.au/flex/flex.htm

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0021

Title: Partnering in the Learning Marketspace

Author: Linda L. Baer and Ann Hill Duin

Organization: Minnesota State Colleges and Universities and Iowa State University

Year: 2000

Abstract: This paper presents a blueprint for helping institutions better understand who to partner with, why and how, for the purpose of establishing a learning marketspace. The development of an initial blueprint for the formation and implementation of successful e-partnerships built on relationships is discussed. A set of critical questions is included for use across multiple types of partnerships. Embracing a learning marketspace concept is imperative if we hope to engage learners with the higher education enterprise, if we hope to engage faculty with lifelong learners, and if we hope to increase the quality and quantity of citizen e-learning and achievement.

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ABSTRACT

This paper presents a blueprint for helping institutions better understand who to partner with, why and how, for the purpose of establishing a learning marketspace. The development of an initial blueprint for the formation and implementation of successful e-partnerships built on relationships is discussed. A set of critical questions is included for use across multiple types of partnerships. Embracing a learning marketspace concept is imperative if we hope to engage learners with the higher education enterprise, if we hope to engage faculty with lifelong learners, and if we hope to increase the quality and quantity of citizen e-learning and achievement.

Partnering in the Learning Marketspace[1]

Linda L. Baer and Ann Hill Duin

As organizations around the world form virtual partnerships as a means to project their learning to global audiences, higher education institutions must find ways to do more than leverage their learning content in the global marketplace by listing their courses at "education marketplace" sites. At the heart of a successful higher education institution is a healthy set of virtual partnerships formed for promoting and sustaining lifelong learning. We believe that there are compelling reasons why new and unique partnerships are needed in higher education. We need to better understanding the competitive advantage that partnerships provide when developed and nurtured appropriately; and in fact, that partnerships will be the predominate form that the delivery of higher education will take in the near future.

This paper offers a blueprint for helping institutions better understand how to partner in order to realize such a marketspace concept. Readers will emerge with increased understanding of the learning marketspace and an action plan for partnering in support of lifelong learners.

Embracing a learning marketspace concept is imperative if we hope to engage learners with the higher education enterprise, if we hope to engage faculty with lifelong learners, and if we hope to increase the quality and quantity of citizen e-learning and achievement.

Twigg, 1994, establishes three basic criteria of a new national learning infrastructure needed if higher education is to meet the challenges of the 21st century learner. The new infrastructure includes: student-centered curricula, just-in-time learning, and electronic collaboration. "The choice of the word *infrastructure* is deliberate. It suggests the need for new arrangements—among institutions; among institutions and corporations; among institutions, corporations and public policy makers—to undergird a technology-mediated environment in which the learner can thrive." http://www.educause.edu/nlii/keydoc/mongraph.html

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[1] Some of the material included in this paper is based on previous publications. The complete version of the work will be available in *Partnering in the Learning Marketspace* by Duin, Baer and Starke-Meyerring.

Twigg challenged us with the following: " It is time to turn our attention to creating something new. It is time to move beyond the walls of our individual colleges and universities to join forces with other institutions, with corporations, and with public policy makers to revitalize American higher education. Together, we can create wealth. Together we can create a national learning infrastructure that will serve the learning needs of our nation as we enter the twenty-first century." Twigg, 1994,13.

Why in the year 2000 are we still in search of the answers posed by Twigg in 1994? We have not seen the development of a nationally accepted set on instructional materials. We have not seen the development of modularized curriculum that will meet the student learning needs in the just-in-time capacity that they require in this knowledge age. We have not seen the development and integration of the comprehensive assessment of student learning throughout the learning experience. In fact, we see little fundamental "transformation" of the academy, at least within the academy. Instead, tremendous growth has occurred in the private sector.

The call during the early years of the 21st century revolves around how to approach fundamental changes in learning. This is occurring outside the academy faster than within due to the numerous challenges inherent in the higher education culture. The challenge for higher education institutions is to recognize that if they are to be players in the education business of today there are new rules, new structures and new partners.

Based on our research and involvement in developing inter-institutional virtual partnerships as well as our scholarship on demographics, construction of online learning environments, and e-mentoring, we believe the hallmarks of the successful learning marketspace to be the **formation of partnerships between organizations in support of lifelong learning.** Unfortunately, however, recent failed partnerships illustrate the lack of understanding and readiness on the part of higher education to embrace partnerships in support of lifelong learners.

What is a learning marketspace?

Duin,. Baer, and Starke-Meyerring (in press) define the learning marketspace as "a gateway through which learners, employers, and learning providers are drawn together into a dynamic Internet based marketplace that creates value for learners, enhances economic development, and engages institutions in meeting the needs of 21st century learners." Examples of such learning marketspaces abound; including HungryMinds.com, UNext, Michigan Virtual Automotive College, and Kentucky Virtual University.

When faculty, students, administrators, policy developers, and practicing professionals in industry learn of these partnerships, they ask crucial questions: Why partner to develop a learning marketspace? What are critical components of a learning marketspace portal? How might we assess an institution's readiness for partnering in the learning marketspace?

Why partner to develop a learning marketspace?

An organization should partner as a means to empower learners and enhance its mission. We offer the following five areas from which your institution might begin a specific discussion about priorities for partnering in the learning marketspace. Keep in mind that these are priorities for partnering in virtual space versus physical place; that any partnership attempting to build a learning marketspace must be aware that it is dealing with a "winner-take-all" environment; and that the hallmarks of the learning marketspace are its emphasis on learner control and relationship building.

1. Cultural shift in learning

Only through partnership can an institution expand educational capacity to the point expected and increasingly demanded by learners. Here goals should be to

- enhance access and the pedagogy of learning; to improve learning regardless of learner location; and
- put the learner in charge, that is, to develop the tools and pedagogy to help the learner make the cultural shift from attending to managing knowledge.

2. Participation in a global economy

A global economy requires educational restructuring. Learners and industries no longer tolerate delay; they expect partnership, access, and response to their needs. Thus, organizations should partner to

- build new economic, intellectual, and social capital to meet the needs of a global economy; and

- provide the opportunity to participate in the global higher education enterprise / economy.

3. Standardization and scalability

Standardization does not mean that everyone does the same thing, nor does it mean that all higher education institutions should look the same. It means that learners, who increasingly take advantage of the multiple opportunities of e-spaces, should no longer be expected to decipher the idiosyncratic system of each individual institution. It means that we partner to minimize capital costs, reduce operating costs, and maximize geographic reach; in other words, we should

- capitalize on the strengths of partners and restructure institutions to take advantage of partnerships; and
- create common, shared infrastructures, for example, a common information technology infrastructure or professional development opportunities.

4. Net-centric niches

An institution's priority for partnership should be less about entrenching one's niche and more about designing and enabling access to aggregated learning opportunities or "net-centric" niches. According to Kelly 1998, "Rich, interactive, and highly flexible in shape, the network economy resembles a biome seething with action, a jungle in fast-forward motion. New niches open up constantly and vanish quickly. Competitors sprout beneath you and then gobble your spot up. One day you are king of the mountain, and the next day there is no mountain at all" (p. 83). Therefore, an institution should avoid clinging to niche areas in the learning marketspace, and instead should

- take advantage of the unlimited dimensions of network spaces;

- study one's assets in relation to a value web instead of a linear value chain; and
- work to bring to market, through partnership, a very different value proposition than is yet available.

5. Human relationships

Partnering in the learning marketspace begins with and is sustained by human relationships. Only through communicating and developing strong relationships can institutions partner to

- respond quickly in meeting the needs of lifelong learners;
- engage learners with the higher education enterprise; and
- share risks while working toward mass customization.

However persuasive the above may be, the majority of institutions largely respond by continuing to pour resources into internal systems rather than collaborating to leverage resources as part of a learning marketspace. Given that one's partners no longer need be determined by geography, this reluctance to partner is even more astounding. Perhaps part of the reluctance stems from a lack of understanding of what a learning marketspace might look like.

What are critical components of a learning marketspace portal?

Learning marketspace portals work to integrate educational offerings from the partnering organizations. As such, these portals may at first appear inferior to traditional institutions because they do not yet deliver the full range of services, such as registration, admissions, community events, learning support services, etc. Developing the full potential of a learning marketspace takes time because its full potential comes only through relationship building and standardization of processes across the partnering institutions. Since each institution has its unique structure, culture, and traditions, such standardization processes are complex and challenging. To begin, partnering institutions can develop critical components in preparation for the learning marketspace portal. In our opinion, three sets of components are critical to the learning marketspace:

- **Information and Access**. These components focus on providing access to aggregated information about learning and employment resources;
- **Streamlined and Shared Services**. These components focus on common credit transfer, registration, admissions, and other standards and procedures; and
- **Relationship Tools**. These components focus on creating knowledge through learning relationships. We believe these learning relationship components to be the number one priority of the learning marketspace. They consist of e-portfolios, e-mentoring, and e-learning communities.

Information and Access

Partnerships should provide seamless access to the career, course, job, and business resources needed by students and practicing professionals. One such project called the Internet System for Education and Employment Knowledge (ISEEK, www.iseek.org) is a model for using technology to enhance and align a learner's career assessment, course choices, and future business opportunities.

This basic tool provides learners, counselors, and employers with a "virtual" advising office for help with needs assessment, institution identification, and financial aid as well as a common catalog for links to courses and class schedule information (potentially from all providers in the partnership). In addition, employers, community groups, and learners of any age or at any location can post requests regarding their specific learning needs and preferred delivery method (face to face, web, ITV, and so forth), and "matches" are then made between the providers and learners. A partnership thus might pool resources to develop a means to enhance and align career assessment tools, course choices, and future work opportunities.

Streamlined and Shared Services

Individual courses / modules, as well as total institutions, are the basic units in the learning marketspace; learners expect our institutions to accept courses from any accredited institution. Thus, the second critical component is the standardization of our credit transfer policies and the development of lifelong learning credit and non-credit banks. Although not yet such a bank, an initiative known as the Course Applicability System (CAS, www.transfer.org) provides one example of a system that is being designed to allow students to input course records and immediately learn where their courses will transfer across partnering institutions and states in the U.S.

To date, participating institutions in Ohio, Arizona, Wisconsin, and Minnesota are partnering on such an initiative to enhance transferability across systems. Institutions in this partnership initiative are building a web application that assists students, advisors, faculty and administrators from two-year colleges and universities to obtain consistent and accurate information about transfer courses and the applicability toward degree completion (http://daraix01.mcs.muohio.edu/cas/).

Relationships

Learning marketspace partnerships must leverage the best content created by the partners and provide a seamless gateway so that learners can access that content from any number of entry points. Along with the need to streamline services is the pressing human need of encouraging and supporting learning relationships. As research on pedagogy consistently points out, learning relationships are crucial for creating knowledge. In the digital age, when learners need to learn how to take control of their learning process, these learning relationships are simply indispensable. To address this need in the learning marketspace, we propose three basic relationship-building components: e-portfolios, e-mentors, and e-learning communities.

E-portfolios. The e-portfolio--a technology that helps learners develop, manage, integrate, and share their information and knowledge with others--is a critical tool of the learning marketspace. We envision this technology to be an online, cross-functional, learner-controlled, personal learning and career development system designed to help learners become responsible and active managers of their knowledge and competencies by putting the control of their learning and career development in their hands. For lack of a better term, we call it e-portfolio, but the descriptors that come closest to capturing it are: a dynamic, integrated, electronic learning management system. A prototype of this concept is currently being developed at the University of Minnesota.

Rather than merely presenting learner information and data as stored at an institution, the e-portfolio focuses on how learners can best use this information to become successful lifelong learners. For example, it allows learners to integrate knowledge, competencies, resources, services, credentials, learner projects, assessment results—anything they need to plan, track, and present their learning and work. An e-portfolio enables learners to create, access, store, and selectively display educational, professional, and personal records, including demonstrations of competencies such as drawings, photographs, writing and design samples, videos of performances, test results, software code, and credentials. Learners create customized versions of their records and send them in seconds to selected audiences such as course team members, counselors, admissions officers, faculty, employers, and others.

e-Mentor concept. As learners begin to control and manage more of their own information and knowledge, institutions will be expected to develop curricula and ways of teaching learners to become active and responsible managers of their own learning, information, and knowledge. Although the e-portfolio represents a technological centerpiece in this process, the technology of the e-portfolio alone is not enough to teach learners how to develop, manage, and share their knowledge. Thus, the e-mentor concept becomes the crucial relationship link between learners and the partnering institutions.

The e-mentor concept focuses on connecting learners with partnering institutions, and more strategically, with e-mentors at these institutions. Associations, businesses, and individuals would indicate the competencies needed and bring their current education, training, and experience in the form of their e-portfolio. The e-mentor helps to identify the gap between what the learner knows and needs to know, and identifies the educational resources available and those needed from a variety of entities (e.g., partnering institutions, corporations, etc.) to meet the learning need. The e-mentor helps the learner to identify the best delivery mode (online, face to face, synchronous, asynchronous), critical content, and e-learning resources that meet the learning need. In short, the e-mentor helps the learner to

- Locate e-learning resources that directly meet the learner's needs;
- Identify learning gaps and locate resources and e-faculty who can help the learner;

- Develop a personal learning plan (e-portfolio);
- Set up an ongoing assessment and achievement plan; and
- Become a responsible and active manager of his/ her information and knowledge.

The E-Learning Community. The e-learning community provides yet another important set of relationships and connections for learners in the learning marketspace. Considering the unprecedented pace of change in knowledge, technology, and society, learners need to expand their ways of learning to include learning from peers and colleagues. Increasingly, learners are understood as experts and experts as learners, resulting in learner-experts learning from each other. Consequently, learners need to have opportunities to interact with other learner-experts in the learning marketspace. Only through interaction with other learners in the learning marketspace can new benchmarks for digital age learning develop, such as benchmarks for knowledge management and e-portfolio development.

How might we assess an institution's readiness for partnering in the learning marketspace?

Our research has lead to the development of a set of readiness criteria, compiled through our ongoing study of inter-institutional partnerships, to help an institution determine readiness for engaging in the learning marketspace. Sharing results from surveying K-12 and collegiate practitioners as well as system level administrators across the U.S., we provide clarity and a concise blueprint for crucial preparation for partnerships.

We determined that the challenge to partner is great. The means to get there begins with an assessment of readiness.

Rosevear (1999), in his comparative case study of eight organizations from higher education, industry, and state governments involved in the development of virtual universities, has developed the following set of questions to assess readiness on the part of inter-institutional partnerships. Again, we have adapted these questions slightly for this context.

- What is the state of the partnering programs' technological infrastructure?
- How prepared are the partnering programs to support virtual learning environments?
- Do they all have equal technological capabilities?
- What is a reasonable prediction for how long it will take before the partnership is operational?
- What are the resources gaps, and how will they be filled?

Based on the experience of developing Minnesota Virtual University, a partnership effort involving 200 institutions, Duin and Baer (2000) add the following criteria for determining readiness for a broad partnership in support of a learning marketspace:

Learner and faculty needs. Are there learning opportunities otherwise denied by existing programs? Are faculty being denied the opportunity to offer their expertise in innovative ways?

- **Leadership committed to the change.** Is there both vertical and horizontal support across the partnering programs? Is there buy-in by the administration, faculty, and staff?
- **E-commerce strategy**. Do the partners have an e-commerce strategy, and does this strategy include an emphasis on lifelong learning?
- **International strategy**. Do the partners have an international strategy, and does this strategy include an emphasis on lifelong learning?
- **Climate to support partnership and change**. Are incentives in place to foster collaboration across the programs?
- **Resources**. Are major resources committed to the initiative? This criterion seems obvious, yet most learning marketspace efforts have failed simply because they, in reality, did not have the monetary resources to build and sustain such an effort.
- **Commitment to learner centered education**. Do the partners foster the development of learner-centered systems? So much has been written about the need for learner-centered systems; however, most programs focus first on what the partnership brings to them rather than on what it should bring to learners.

Invariably, those engaged in the development of learning marketspace partnerships point to leadership commitment as the single most important criterion for such partnerships. Robinson and Daigle (1999-2000), in their recent analysis of California State University's failed partnership known as the California Educational Technology Initiative (CETI), state that "full executive engagement is an absolute requirement at both the system and campus levels" (p. 26). The reason for the significance of this readiness criterion is the disruptive nature of learning marketspaces, which means that they cannot be limited to reproducing existing institutional processes and structures, but rather require organizational learning and change. Considering the need for standardization across participating programs alone, the critical need for leadership commitment becomes perhaps more apparent. In other words, develop a partnership only if the administrators in charge are in full support of the partnership.

Drawing on public management theory, Robinson and Daigle present a conceptual framework of institutional readiness for public-private partnership development. Their framework integrates an action context (descriptive-explanatory, normative, assumptive, and instrumental actions); with a developmental sequence, which moves as follows: from vision → commitment → culture → risk → power → adaptability.

We provide a synthesis of their framework in figure 1, creating a series of steps and corresponding set of framing questions as an initial blueprint for programs planning to partner in the learning marketspace. This framework becomes extremely useful when applied to partnerships, particularly those at the meta-level.

Institutions need to approach partnerships with deliberateness and clear rules of engagement. For example, each partner needs to clearly determine the definition of partnering. The literature describes many types of partnerships including those with limited partners, strategic partners, full partners. Each type of partnership has specific implications for the participants. Partnerships need to determine the purpose for which the arrangement is in place with stated outcomes and time parameters.

Partners need to determine the guiding principles that are foundational to the partnership. Examples in the learning marketspace would be focus on learner-centered design; faculty, lifelearner and business involvement at all levels of the initiative; a commitment to leveraging efforts between units involved in the initiative; and a focus on quality, flexibility, efficiency and accountability.

Inherent in the principles are assumptions about what each partner can achieve as they work together. Clear delineation of what each partner is responsible for is critical. Examples include the development of a one-stop portal where all services are available for learners. Expectations may include web registration, tracking of learners for future relevant offerings, credit or non-credit banking features, e-portfolios/e-transcripts/e-mentors for the learner, faculty training for the development of the offerings, and ongoing evaluation and research of lifelong learning.

An agreed upon operations chart must undergird any partnership. For example, how will the operation work? What is the role of a vendor and how and with whom does the vendor interface with the campus?

Readiness for the partnership is based on vision and how the partnership meets the bigger picture. Educational vision often includes serving the greater good or educational service as a part of the social contract. The commitment to the partnership must also have multiple levels of leadership committed to the partnership for the foreseeable future.

We have found that successful partnerships must include the commitment to the fact that collaboration and cooperation are more important than hierarchy and competition. Within this context, the capacity to sustain the risk involved in large-scale partnering must be delineated. Critical to successful partnerships is the determination of who has the authority. Where does final authority reside and who has decision-making responsibility?

Finally, meta-partnerships will *require* adaptability. How much are institutions willing to alter the direction, structure, and operations to sustain the partnership? Can institutions of higher education create the environments where adaptability can survive and thrive?

Each of these questions must be addressed in open and frank discussions across the multiple levels of the institution. Each component of the blueprint is critical to the other for sustainability over time. All components together create the network required to sustain and maintain partnerships within the learning marketspace.

Conclusion

Partnership formation is a process of discovery and disclosure, and readiness begins with establishing communication, trust and support. If communication and trust are established, and if the partnering institutions are willing to start small and embrace the disruptive potential that the learning marketspace represents change can be sustained. Once the partnership is initiated, a learning marketspace partnership ensures that an institution intends to meet the needs of learners and that the partners intend to inhabit and innovate within both spaces and places. This is where the challenge of higher education meets the reality of the 21st century learning demands and expectations. This is where the greatest dissonance will reside for higher education. But it is also where the most dramatic revolution in learning for all citizens can and must be realized. Embracing the learning marketspace model brings a metamorphosis to the institution and a rebirth in its understanding of learning.

Figure 1: An Initial Blueprint for Partnering in the Learning Marketspace (Robinson and Daigle)

Step	**Questions to address**
Description	What is it (i.e., the partnership)? How will it affect my institution?
Beliefs	What are the guiding, foundational principles?
Assumptions	What can my institution assume that we can achieve together from this partnership? What will each partner do or be responsible for?
Operations	How will it work? Is it feasible?
Vision	What is the greater vision or greater social good?
Commitment	Are multiple levels committed to it? Are levels of trust and covenants in place?
Collaboration	Are collaboration and cooperation more important than hierarchy and competition?
Risk	Can we tolerate the financial, legal, academic, and/or experimentation risks?
Control	Who has the authority? Where are clear lines drawn?
Adaptation	Are we willing to alter the direction, structure, and operations to support the partnership?

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Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0048
Title:	Portals: A Framework for Customer Centered Resources
Author:	Oren Sreebny
Organization:	University of Washington
Year:	2000
Abstract:	Student portals, faculty portals, alumni portals, continuing education portals--what's wrong with this picture? The emergence of portal technology, along with related back-end systems including e-commerce and exchanges, offers an opportunity to tailor and personalize the relationship between an educational institution and its many clientele. At the University of Washington we are working with a deceptively simple model to fit the many pieces together in a way that puts the customer at the center of our view and focuses our energies on keeping and strengthening our relationships over a lifetime. We will describe the model and the concepts behind it, and present the results of work to date.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0009

Title: Southeastern Native American Documents, 1763-1842

Author: Robert E. Henneberger, Nan McMurry, and James B. Lloyd

Organization: University of Georgia and University of Tennessee

Year: 2000

Abstract: In 1999 the University of Georgia Libraries, the University of Tennessee at Knoxville Library, the Frank H. McClung Museum, and the Tennessee State Library and Archives were awarded a one-year National Leadership Grant from the Institute of Museum and Library Services to digitize 1,000 original documents and visual images relating to the Native American population of the Southeastern United States. These documents and images were selected from the most significant holdings from each collection and range in date from 1763 to 1842. The original documents reside in many separate manuscript collections within participating institutions, but as digital entities they are being brought together into a single electronic collection. The final product will be a database of facsimile images and transcribed texts, individually cataloged and full-text searchable, mounted on GALILEO (Georgia Library Learning Online).

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Southeastern Native American Documents, 1763-1842

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Knoxville
Tennessee

In 1999 the University of Georgia Libraries, the University of Tennessee at Knoxville Library, the Frank H. McClung Museum, and the Tennessee State Library and Archives were awarded a one-year National Leadership Grant from the Institute of Museum and Library Services to digitize 1,000 original documents and visual images relating to the Native American population of the Southeastern United States. These documents and images were selected from the most significant holdings from each collection and range in date from 1763 to 1842. The original documents reside in many separate manuscript collections within participating institutions, but as digital entities they are being brought together into a single electronic collection. The final product will be a database of facsimile images and transcribed texts, individually cataloged and full-text searchable, mounted on GALILEO (Georgia Library Learning Online).

Southeastern Native American Documents, 1763-1842

Project Description

In 1999 the University of Georgia Libraries, the University of Tennessee at Knoxville Library, the Frank H. McClung Museum and the Tennessee State Library and Archives were awarded a one-year National Leadership Grant from the Institute of Museum and Library Services to digitize 1,000 original documents and visual images relating to the Native American population of the Southeastern United States. These 1,000 documents and images were selected from the most significant holdings from each collection and range in date from 1763 to 1842. Although the primary focus of these collections is the Cherokee tribe, other tribes are represented, such as the Seminole and Creek. These documents have been identified over the years by the librarians and scholars who have worked with them, and they include official documents such as treaties, laws and military orders, personal letters written by both Native American and white authors, and the first newspaper published in a native language, the Cherokee Phoenix. Individually, most documents are relatively brief, from one to ten pages in length, but when combined they form a rich corpus capable of supporting any level of research or educational outreach.

Collectively, the Southeastern Native American holdings of the participating institutions are the most comprehensive in existence. The original documents reside in many separate manuscript collections within the participating institutions, but as digital entities they are being brought together into a single electronic collection. Work on this project began in November, 1999, and the final product will be a database of facsimile images and transcribed texts, individually cataloged and full-text searchable, mounted on GALILEO (GeorgiA Library Learning Online), the World Wide Web-based server sponsored by the Board of Regents of the University System of Georgia, available to the public at large at http://www.galileo.peachnet.edu.

We have requested funding to continue the project for a second year, incorporating another 1,000 documents and including two new partners, the Tennessee State Museum and the Museum of the Eastern Band of Cherokee. The limitations of traditional print collections described below (see **Need for Digital Access**) are one of the driving forces behind this second proposal, for in gathering materials for the current project we have identified additional documents that far exceed the number originally projected and extend back in time earlier than the original starting date of 1763. Doubling the size of the digital collection, extending the starting date back to 1730, and including the holdings of two additional institutions would bring us significantly closer to the long-term goal of creating a comprehensive electronic repository of primary source materials on Native American history in the Southeast and offering a model for the digitization of similar materials in other parts of the country. It is our intention to utilize the practices and work flows developed through this grant to continue developing the Southeastern Native American digital collection and to include additional partner institutions that have expressed an interest.

Significance and Scope of the Documents

"Southeastern Native American Documents, 1763-1842" has well-defined limits of geography and time period, but its content is of national significance. The importance of native tribes in the early history of America has been universally acknowledged, but primary sources remain scarce, especially for students below the college level and for the general public. The documents selected for this project serve to communicate to the modern reader how Native Americans viewed the European settlers as fellow human beings, both positively and negatively, from the first contacts to the point when they were forcibly removed from their lands. Conversely, these documents also reveal how Europeans perceived Native Americans during the same time span. The interaction between European settlers and the Native Americans was the first step on America's long and continuing journey towards cultural diversity. These documents will also serve to provide insight to the everyday life and social structure of Southeastern Native American societies through seldom seen source documents. The depth and scope of the resulting digital collection of source documents cannot be found anywhere else.

Documents and images selected for the first year of the project include formal treaties between British/American officials and tribal representatives, letters recording the negotiations that formed the background to the treaties, Native American law codes, and other sources that testify to the richness and continued viability of Native American culture even as it was encroached upon and eroded by European settlement. If we receive a second year of funding similar materials will be added from the University of Georgia's Hargrett Manuscript and Rare Book Library, the University of Tennessee Library's Penelope Johnson Allen collection and the Tennessee State Library's Cherokee collection. The McClung Museum's Tellico Reservoir Archaeology Project collection, on which digitization began in the first phase, will receive greater emphasis in the second, as it represents the comprehensive archaeological record of Cherokee town and house sites in the eighteenth and nineteenth centuries. The maps, photographs and report tables in this collection provide information on town and house structure and histories of individual Cherokee settlements. This material is of great research value, but is difficult to use in its traditional formats due to their diversity and vulnerability to deterioration. Documents from the two new partners in the second phase of the project, the Tennessee State Museum and the Museum of the Eastern Band of Cherokee, include the papers of William Holland Thomas, the individual who is almost single-handedly responsible for the continued residence of the Eastern Band in North Carolina.

Need for Digital Access

The early history of Native Americans in the Southeast, as in most of America, is a story of voices falling silent. At times the silencing was sudden and violent, as in the forced migration known as the Trail of Tears that tore so many natives from their homes forever. It also proceeded more subtly, as when native languages lost their last speakers. The silence can persist even in carefully preserved historical documents when wide public access to them is lacking.

The organization of many manuscript collections, while faithful to the principle of provenance, is often at odds with the needs of scholars, who pursue subject themes that can range across many collections. The Hargrett Rare Book and Manuscript Library of the University of Georgia, for example, houses a rich store of materials documenting the early history of Native Americans in Georgia, yet no single collection or even a group of collections is the source of this wealth. Because they are dispersed throughout the holdings of this library as well as others, documents concerning Native Americans are as scattered and silent as the native authors who produced them. Traditional collection descriptions and finding aids, when they exist at all, are of limited value in identifying subjects covered at the item level, leaving scholars to rely on the expertise of archival staff members, whose collective knowledge varies over time as they take other positions or retire.

Even when identified, many of these documents are available only in their original form, and access to them is possible only through prior arrangement with the staff of the collection in which they reside, and only under strictly controlled circumstances due to the age, value and condition of these materials. Given these necessary restrictions, it is not surprising that the primary users of these original documents are advanced scholars. Special collections in state institutions and museums are generally open to all, and classes of school children and other non-university groups do make frequent visits, but usually only for tours rather than for actual use of collections.

Digital technology can end the silence of Native American voices by creating a new, virtual collection of Native American documents and revolutionizing access to these materials. Users will not have to travel to the particular university or museum to view them; vulnerable originals will not be handled; and multiple users, including entire classes of school children, will be able to examine the same document simultaneously.

The research potential of this collection is immense, but it also holds great promise for education at the secondary and elementary levels as well as interest for the public. Students below the college level seldom receive adequate exposure to primary source material, particularly documents that portray Native Americans as complex individuals in a dynamic society. Many items have obvious dramatic appeal, but they can also function as bridges to other materials in which Native American voices speak for themselves anew.

Public interest in history, especially the history of specific regions, ethnic groups, local communities and families, is also widespread, but has been hampered by the lack of easily accessible source material. Recent years have seen a great increase in the number of Native Americans and African-Americans searching for their roots, but traditional genealogical sources are not as helpful to groups whose ancestors suffered subjugation and dispersal. Collections such as "Southeastern Native American Documents, 1763-1842" can fill this void with a generous supply of specific detail. One letter describing slaves allegedly "stolen" by Native Americans, for example, includes the names of all the slaves and their owners, as well as a physical description of each slave.

Because "Southeastern Native American Documents, 1763-1842" will be a public database in Georgia's GALILEO system (please see http://www.galileo.peachnet.edu), available to all World Wide Web users, we anticipate that the audience for original documents concerning Native Americans will expand from a small cadre of scholars to a wide range of interested viewers of all ages and backgrounds.

Ownership, Privacy and Copyright

With an ending date of 1842, it is doubtful that free distribution of this collection will infringe on the privacy of any contemporary individual. In the period covered by this project, however, it is difficult to tell what is and what is not, official correspondence. This is important because the writers of private letters retain the copyright until cleared by current law, while the writers of official ones do not. The individuals represented in this collection almost all held official posts of one kind or another, so we have to determine on a case-by-case basis whether the documents in question seem to be preponderantly personal.

Preparation and Preservation

About three-quarters of the documents in this collection are handwritten. Although the paper has yellowed and the ink has bled through in some of the oldest documents, their overall condition is quite good, since they are generally on rag rather than pulp paper. Some have been encapsulated, and most are in acid-free storage files and boxes. Individual items are pulled from their respective collections and assembled as one unit for this project. Those items not already in containers are placed in the proper containers. All of this work takes place within the manuscripts area of each participating organization. Scanning is performed on a flatbed scanner or an overhead scanner, whichever better minimizes harm to the documents. Transcriptions are prepared using the scanned images to avoid any unnecessary handling of the originals. After scanning is complete, selected portions of the University of Georgia collection will be microfilmed for long-term archival storage.

Work Process and Standards

Every page of every document is scanned at 300dpi, in color with a color depth of 24 bits. After many experiments with handwritten manuscripts, we have determined that using this level of resolution and scanning in color most faithfully reproduces the original. In addition, a 24-bit color image scanned at 300 dpi generally has a better readability in manuscript materials than a grayscale image of the same dpi.

The writing on the vast majority of the documents is quite large, and there are no fine details in the handwritten pieces. Large format scanners can scan originals up to 11 X 17 inches (most documents in this project are smaller than this). Pages exceeding 11 X 17 inches are scanned in sections and pieced together using Adobe PhotoShop.

The original scans are LZW compressed TIFF (Tagged Image File Format) format files, averaging 12 to 20 megabytes in size. The LZW compression is a lossless compression, and the only image manipulation of the TIFF images is rotation and cropping. The high-resolution TIFF images will be retained by the respective institutions for archival purposes.

From the TIFF images, we produce 300dpi DjVu images for use by the public. DjVu is a file format developed by AT&T and now supported by Lizardtech (http://www.lizardtech.com). A sample of images in this format is available at: http://www.libs.uga.edu/darchive/hargrett/bits/native/creek/creek.html. Even though the images will be very large, the DjVu viewer allows the user to zoom in or out on each image so that the whole image can "fit" on a computer screen, or a small portion can be "zoomed" into to see detail. Because access to the information on the images will be through the full text searching of their transcriptions, it will not be necessary to provide thumbnails of the page images. We use Adobe PhotoShop for all image manipulation and the DjVu software package for conversion from TIFF to DjVu format.

Every document is transcribed into an SGML (Standard Generalized Markup Language) document with pointers to the DjVu images of the original documents. SGML markup not only makes it possible for every word of text to be searchable, but also provides for more sophisticated searching strategies as described below.

Each item is also cataloged as a Dublin Core, CORC record. Cataloging of each item is done according to accepted standards and practices, and the resulting records reside in the OCLC CORC master file, accessible for searching to users at all participating OCLC institutions. Bibliographic elements from the cataloging records are included in the headers of the SGML documents so that they may be searched along with words in the document texts.

All the documents will be mounted together as a single fully searchable text database on Georgia's statewide GALILEO system. Although the commercial databases on GALILEO are not available to locations outside of Georgia, several non-commercial databases are universally available, such as the Georgia Government Documents database produced by the University of Georgia Libraries (also accessible at http://www.galileo.peachnet.edu). "Southeastern Native American Documents, 1763-1842" will be a universally available database.

As a fully searchable text database, this collection will be searchable by any word or phrase found in any of the documents, including the information found in the headers of those documents, such as author, title, and subject headings. By using SGML, searching can also be done by data type. For example, a user could search for a surname only within correspondence, or for a place name only within treaties. Search results will be available as both DjVu images of the original handwritten documents and the SGML transcriptions.

A test database containing many of the documents digitized in the first phase of "Southeastern Native American Documents, 1763-1842" is in place now. Following a final review, this database will go into production through Galileo before the expiration of the funding period, with more documents being added as transcription and SGML markup are completed. The availability of this database will be widely announced through existing channels established for other GALILEO products as well as in national forums such as the NINCH (National Initiative for a Networked Cultural Heritage) and Imagelib electronic lists.

Sustainability

The original documents used to create "Southeastern Native American Documents, 1763-1842" will of course be retained in the special collections where they now reside. In addition to digitizing these materials, we have also preserved most of them on microfilm for long term archival retention. Long-term retention of the TIFF images and SGML files created in this project will be on CD-ROMs. As with all of our data retained on CD-ROM, we will sample 20% of our CD-ROM collection each year and re-record any questionable CDs. Also, as new, more permanent storage technology becomes available, we will migrate data to that media. As regards the database, all data on the GALILEO servers is backed up daily by an automated tape system.

Evaluation

"Southeastern Native American Documents, 1763-1842" will be subject to the extensive review and evaluation process required for all GALILEO databases. Each new database is first tested and evaluated by project staff and the GALILEO Director of Virtual Library Development for design and functionality. It is then announced as a demonstration database to the GALILEO Reference Subcommittee composed of reference librarians from university, school and public libraries throughout the state. This group reviews the prototype database with their varied constituencies in mind, consulting other professionals as appropriate and making recommendations for adjustments and improvements. At this point the internal review is complete, and the database is announced and made available to all GALILEO users.

After a new database goes into production there are additional avenues for ongoing evaluation. Every major GALILEO screen includes a "leave a comment" button which any GALILEO user can employ to communicate with GALILEO central-office staff. Feedback concerning "Southeastern Native American Documents, 1763-1842" will be routed back to project staff at the University of Georgia and its partner institutions for their consideration.

In addition to this direct method of evaluation, GALILEO also collects use statistics and conducts annual user surveys. This information is available to all GALILEO users at http://www.peachnet.edu/galileo/evaluate.html and will be used by project staff to monitor the amount and type of use received by "Southeastern Native American Documents, 1763-1842" database.

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Abstract

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Title:	The Digital Divide: A Country Western Technology Song
Author:	Janet K. Poley, Dan C. Cotton, and Valorie F. McAlpin
Organization:	ADEC, University of Nebraska-Lincoln, and University of Maryland
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Abstract:	This session took a "singing" look at the patterns of convergence/emergence in rural and innercity sections of our nation. Poley, Cotton (a singing technologist), and McAlpin are working on a national digital wireless project to bridge the digital divide.

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The Digital Divide: A Country Western Technology Song

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This session will inform and entertain with a "singing" look at the patterns of convergence/emergence in rural and innercity sections of our nation. Poley, Cotton (a singing technologist), and McAlpin are working on a national digital wireless project to bridge the digital divide.

THE DIGITAL DIVIDE: A COUNTRY WESTERN TECHNOLOGY SONG

I. Introduction

The phrase "Digital Divide" has emerged as a description much like the word "diversity" as an attempt to characterize a set of varied demographics and situations. In January Steve Cisler wrote in the San Jose Mercury News that "digital divide" has a nice ring to it, but it is simplistic, insulting to some, and if it has the half life of other techno jargon, it should last no longer than "infobahn" and "techno-realism."

Many of us are increasingly uncomfortable with "lumping" a lot of important, rich and uncomfortable statistics and information into something called the "digital divide." There is real danger that "digital divide" ends us pushing to the margins or periphery a whole set of important issues related to the drive toward digital, Internet, bandwidth and all else associated with becoming a knowledge society.

Instead of producing fertile ground for the emergence of new ways - we might simply end up with a convergence of those "left out." It is difficult to talk intelligently about the situations and applications appropriate for rural poor communities, rich rural communities - Ted Turner is the biggest landowner in rural Nebraska. Inner city neighborhoods are not the same irrespective of location. African Americans, Asians, Hispanics and Indians are converged together only because they are not white or Caucasian. Increasingly, the disabled and even the elderly are considered to be on the "other side" of this digital divide.

Closer to home, colleges and universities have begun calling application of technology to education asynchronous learning or distributed education. By dropping the word distance from education, we can again forget that not all learners live in wired dorms or fibered suburbs.

II. Concentration of Poverty: Deconcentration of Opportunity

A growing problem of the digital millennium is the increasing polarization between the information haves and have nots. Land-grant universities can be part of the problem or part of the solution. When land grants first began in 1862 and 1890, the U.S. was an agrarian society, and research-based agricultural information was critically needed for the economic well-being of families in rural communities. We have a decreasing number of farms, but there remains a significant number of poor, low-income residents living in isolated rural communities and inner cities, 5.9% of whom do not even have a telephone. As technology continues to develop, the gap between the information haves and have nots continues to widen.

Who are the information haves and have nots? According to a Department of Commerce study, the haves include young, white males with middle to upper incomes. The have nots include the elderly, undereducated, racially/ethnically oppressed, unemployed, physically handicapped, the imprisoned and the rural poor.

Recent reports released by the Department of Commerce, *Falling Through the Net,* (1997) and The Children's Partnership (TCP), indicate that many people in inner cities and isolated rural areas do not have access to technology or the tools of their more affluent suburban neighbors. A deeper problem is that many poor neighborhoods lack the infrastructure available in more affluent areas. Too often, telephone and cable companies will redline poor, inner city neighborhoods while moving quickly to wire wealthier suburbs with advanced systems. This strategy often leads to a spiral where the lack of investment at the community level leads to fewer economic opportunities for people who live there, resulting in continued poverty making it even less inviting for investors and economic growth. The Office of Technology Assessment (OTA) described the effect as " the concentration of poverty and the deconcentration of opportunity."

The TCP report entitled, *Online Content for Low-income and Underserved Americans: The Digital Divide's New Frontier (www.childrenspartnership.org),* examines a critical element of the digital divide debate—-relevant content. The technology infrastructure is a necessary but not sufficient ingredient. What kinds of programming content are most interesting to rural, isolated communities or poor inner city communities? Are their interests, needs and concerns the same as the more affluent suburban communities? Through focus groups and interviews, TCP found that "underserved adults want to engage in social, cultural and professional activities online with special emphasis on local information about entertainment, jobs, places of worship and educational opportunities. TCP's research also found a number of barriers between the content people want and what is available online. Barriers include a) lack of local information, b) literacy barriers, c) language barriers, and d) lack of cultural diversity.

III. New Teaching and Learning Models

ADEC recognizes that 21st century information technology is driving the development of new teaching and learning models. Constructivist epistemologies, as opposed to the objectivist pedagogies of the industrial age, encourage experiential learning and new ways of knowing or meaning-making. Flexible, learner-centered models are replacing the inflexible "sage-on-the-stage," teacher-centered models of the last 100 years. Education is now more democratic than ever, with unprecedented access to information and the power it yields. Yet, without adequate technical and human infrastructure, many of our land-grant institutions are unable to compete in this new knowledge environment, and the gap between the information haves and have-nots continues to widen.

The evolution of teaching and learning can be viewed by examining four generations of distance learning. The first generation is correspondence study whereby printed materials were mailed to students and the only interaction was in returning tests….. still highly popular with some 4 million homes subscribing to correspondence study. The second generation is multi-media with print. Learners might use a videotape along with a workbook or satellite broadcasts with printed materials. Still very little interaction between the teacher and learner and virtually no interaction among the learners themselves. Third generation models include online learning and web-based courses with a dramatic increase in interactivity and collaboration between and among students and teachers. There is still another generation of teaching and learning just beginning to emerge. This fourth generation includes Internet2 with virtual reality, simulations, voice recognition, and interactive video.

New teaching and learning models offer high quality learning anytime, anyplace without regard to distance or time. Learning is modular, self-directed, open, flexible, and learner-centered as opposed to teacher-centered models of the past. New distributed learning models focus on active learning, reciprocal teaching and cooperative learning…..building on the students' learning style, experiences, and ways of knowing. Learning is interactive and asynchronous rather than the passive, one-way broadcast learning of the past. There is a shift from objectivist, behavioral approaches to constructivist approaches that emphasize critical thinking and constructing new meaning from knowledge based on one's own experience and way of knowing as opposed to accepting knowledge because someone else says that it's true. Students also have unprecedented access to knowledge sources, including industries, peers, and experts throughout the world.

IV. New Research Models: Beyond comparative studies

What kind of research will be needed to help frame evaluation studies on the effectiveness of new learning strategies? Past research has been largely dominated by comparative studies. These studies typically ask the question if there is any difference between teaching with a particular distance technology and face-to-face teaching. These studies have all revealed that there is basically "no significant difference" in learning outcomes with distance teaching versus face-to-face teaching. McAlpin's (1997) dissertation research examined factors impacting the academic performance of online students versus face-to-face students and found that there was no significant difference in course grades between the two groups of students. This study, however, revealed some key questions about instructional design and operational definitions of the delivery system. What were the dimensions of the online learning environment? Did the instructor use constructivist, asynchronous, learner-centered approaches or was the learning traditional in its design and simply delivered via technology?

Smith and Dillon (1999) writing in the American Journal of Distance Education propose a framework based on media attribute theory that can be used to classify both media and delivery systems based on research related to learning and motivation. They further posit that the "problem with comparison studies lies not in the comparison," but with the media/method confound. According to Smith and Dillon, it is important that comparative studies not only address which technologies were used, but why and how the media and delivery systems were used to support learning and motivation. They provide a framework for defining the variables used in studies that compare delivery systems and alternative distance learning systems.

The Smith and Dillon (1999) framework defines categories of attributes embedded within each delivery system that may support learning in different ways. With technology choices becoming increasingly more complex and with convergence to digital platforms, identification and operational definitions of the attributes of delivery systems play a major role in identifying learning outcomes. For example, one feature of a delivery system is bandwidth. The medium attribute then would be realism. Another feature of a delivery system might be one-way or two-way interaction. The medium attribute would be interactivity and feedback. If the delivery system is synchronous or asynchronous, the medium attribute is immediacy on interaction, which has implications for pacing and responsiveness of the learning design. One feature of the delivery system might be the delivery interface with branching as the attribute with implications for learner control and navigation. This framework can help researchers identify new constructs in their search for answers to 21st century problems of distance learning.

V. The Principle of Common Carriage Depends on Point of View: Open Access: Forced Access

The Telecommunications Act of 1996 enacted a competitive principle embodied by the dual duties of nondiscrimination and interconnection. See 47 U.S.C. s.201 (a) ...s. 251 (A) (1)... Together, these provisions mandate a network architecture that prioritizes consumer choice, demonstrated by vigorous competition among telecommunications carriers.

The consumer federation of America published Principles of Nondiscriminatory Access to Broadband Internet Communications Services, August, 2000. The document states:

> "As communications and commerce converge on the broadband Internet, the public right to nondiscriminatory access to communications networks becomes more important than ever. Public policy should guarantee that right, by embracing eight basic principles:
>
> 1. Ban Discrimination
> 2. Maximize ISP Access
> 3. Enforce Nondiscrimination Through Private Action
> 4. Minimize The Anticompetitive Effects of Technical Limitations
> 5. Require Comparably Efficient Interconnection and Nondiscriminatory Operational Support Systems
> 6. Ensure Confidentiality of Customer Information
> 7. Require Subsidy Free, Nondiscriminatory Pricing
> 8. Require Wholesale Relationships Between ISPs and Facility Owners"

VI. ADEC - National Science Foundation Project

In late August, the American Distance Education Consortium, an organization of approximately 60 state universities and land-grant colleges, learned that it has been awarded a three-year grant from NSF for the Advanced Internet Satellite Extension Project (AISEP). This $4 million effort will develop and deploy advanced Internet services and technologies over satellite infrastructure for purposes of enhancing research, instruction and learning in a diverse set of institutions of higher education.

This combined effort by ADEC and Tachyon, Inc. will extend the benefits of Internet2 to a broader set of institutions and provide experience with advanced satellite-based Internet technology. The project will be managed by ADEC and led by a core set of ADEC member institutions engaged in the Internet2 project. ADEC bridges the Internet2 community to an extended set of diverse institutions of higher education. Tachyon will provide the technology capable of connecting the Internet2 community to institutions unable to access the Internet2 backbone network because of location.

This project focuses on bringing advanced networking applications to more remote campuses and learning centers. It will enable a broader community to engage in research, create access to remote instruments and data sources, share instructional and learning resources among a more diverse student population and create access by the research university community to cultural and human resources from otherwise inaccessible institutions and extension offices.

This project will work closely with the NSF financed project managed by Educause focused on Minority Serving Institutions. ADEC will also work closely with CAIDA and NLANR, as well as other appropriate partners.

VII. AISEP Goals and Objectives

The primary project goals are to:

1. explore the use of satellite technology to deliver Internet services so as to determine the compatibility of this new technology with services and applications being developed within the Internet2 project; and

2. explore the deployment and integration of distance education applications, including collaborative applications at rural, remote institutions and extension learning centers that have previously been unable to access such technologies.

Research objectives of the project will include but are not limited to:

1. establishment of what constitutes "pretty good Internet" for remote locations;

2. construction of and support for a satellite based IP network;

3. connection of the Tachyon satellite gateway to the San Diego NAP (commodity and Internet2 service providers);

4. provision of Tachyon Access Points to selected ADEC members not accessible via the traditional Internet infrastructure;

5. Investigation of QOS using Tachyon/Internet2 Quality of Service capabilities to enable distance

education application;

6. collaboration with NLANR and CAIDA measurement teams to study network performance;

7. Utilization of QOS to deliver through the Internet including satellite wireless last mile solutions;

8. establishment of requirements to support this type of network;

9. establishment of the parameters for a sustainable business model.

VIII. Need for Project

Dr. Rita Colwell noted in her keynote address to Educause last year that there is a tremendous need for greater research and development efforts in wireless technologies to bring affordable "last-mile solutions." There is further need to integrate these solutions into supportable propositions about teaching and learning applications. Filling bandwidth with digital video without careful attention to design will not improve teaching and learning. A research base does not exist to support the proposition that more bandwidth means more learning.

This project will convene a blue ribbon panel that will also help build a more constructive, theoretically supportable framework for optimizing these systems for learning. John Patrick, IBM, stated recently that the real problem is figuring out how to integrate all the applications in a way that makes sense and how to design the applications so they are simple to understand and able to do what we want them to do.

This past summer the ADEC lead institutions for this program worked closely with Tachyon in pre-testing the Tachyon satellite system. The following describes the pre-test and recorded results:

IX. Pre-Test: June 5-August 4, 2000

Tachyon Access Points were installed at the following university/organizational locations with support from campus project leaders: North Carolina State University; University of California-Davis; University of Nebraska; University of Illinois; University of Maryland; and Washington State University. The Tachyon support team was led by Michael Liebhold - Business Development; and a corps of company technicians. Tachyon provided scheduled access to its three core service levels which include C1 (300K); C2 (800K); and C3 (2MB) service.

X. Tachyon Configuration and Equipment

The Tachyon network is carried on geostationary satellites supporting bi-directional communications. Physical characteristics of the technology feature "bursty" access to network resources. Given current

Tachyon network management decisions, the network supports certain Internet applications very well (i.e., Web, POP3 e-mail, FTP). TAP forward channel speeds are offered in three different configurations: C1 (300Kbps); C2 (800Kbps); and C3 (2Mbps) service, with a return channel of < = 256Kbps service. The return channel of < = 256Kbps is a ceiling established by the FCC. The reverse channel uses a multi-carrier TDMA (time division multiple access) methodology to provide connectionless operation and maximize bandwidth allocation. The Tachyon network employs KU Band service which makes it somewhat susceptible to certain weather degradation (rain fade). Tachyon uses SATMEX transponder services that cover North America, and portions of Central and South America. Tachyon intends to provide global services by 2002, with second and third roll-out phases covering Mesoamerica, South America, Australia, South- east Asia, the Middle East and Africa. Tachyon is not an ISP.

All ADEC TAPs (Tachyon Access Points) access the public Internet via a DS3 connection to UUNET's commercial backbone. The local loop for this DS3 connection is provided by Time Warner, and runs from Time Warner's San Diego POP facility to the San Diego Super Computer Center.

The Tachyon Access Point (TAP) installed at each campus includes a small terminal that connects users to the Tachyon network/Internet. The outdoor unit includes a small satellite dish (<1 meter) and integrated transmit/receive electronics that send and receive satellite data (WSU is using a 1.2M dish). The indoor equipment includes a network server consisting of a PC enclosure with a custom satellite modem connected to local campus LAN equipment via a 10/100BaseT Ethernet interface. The Tachyon network server connects to the outdoor unit via a coaxial cable.

XI. The ADEC/Tachyon Application/Communication Server

A server (Linux-based) supplied by the University of Nebraska on behalf of ADEC for satellite link testing was co-located at the Super Computer center in a Tachyon-leased rack, and sits behind a Tachyon-managed Cisco router. It was configured with Chariot endpoint software to accommodate Chariot testing. It provided the consortium with data collection services in support of general user testing, and a discussion group/sharing capability.

XII. ADEC Institutional Configurations

Each land-grant institution located their TAP on or near their respective campus. Tachyon provided, at their cost, TAP installation services and support. Each campus configuration was somewhat unique, yet together the configurations provided a good opportunity for a variety of different users to access and test the system. Between 120-130 users accessed the network at one time or another, with nearly 30 using the system on a semi-regular basis. TAP'S were connected in a variety of configurations.

University of Nebraska: A 10 port VLAN within the University's network.

University of Illinois, Urbana - Champaign: A 15-machine network on a single 10Mb Ethernet physical segment supporting a computer training lab.

University of California - Davis: The UC Cooperative Extension Yolo County office was connected to a 10BaseT hub.

University of Maryland - College Park: A hub connected to three computers at the University of Maryland's State 4-H Office.

Washington State University: The TAP was connected to a single computer on the Washington State University campus. They used a 1.2m dish, the larger dish was needed due to weak signal strength from SATMEX.

North Carolina State University: A hub connected to an NT 4.0 computer and Windows CE Thin Clients (ICA) and PCS as desired/required for testing.

XIII. Test Results

Testing was organized into two categories: (1) programmed testing with specific technical data being collected; and (2) general testing by users.

Programmed testing involved collecting specific statistical data relative to network performance. General testing involved users at institutional sites and activities considered outside the programmed tests.

The University of Nebraska led the programmed testing using Chariot client software that generated specific system performance information (data rates, error rates, and latency). Chariot also was installed on the ADEC/TACHYON server.

A Web form and discussion environment was used to collect both programmed and general test results. Maintaining group communication was key throughout the testing period. One-hour audio conference calls were scheduled each Friday morning from 11 a.m. to noon CDT throughout the test. The calls kept people informed, monitored progress, and discussed technical issues.

A. Programmed Test Results

1. Availability - WHATSUP Summary:

UNL used a product called WHATSUP (http://www.ipswitch.com/) to monitor the Tachyon network uptime. WhatsUp is an inexpensive graphical network monitoring tool that initiates both visual and audible alarms when monitored network elements do not respond to polling. It will even notify you remotely by digital beeper, alphanumeric pager, or e-mail!

A WHATSUP monitor was placed on a test computer (host77) on the Tachyon net. This WHATSUP program monitored the ADEC server at Tachyon, every 15 seconds. This test basically checked the availability of the Satellite network. A WHATSUP monitor was also placed on a computer in the UNL main computer room. It monitored the ADEC server, the test computer (host77), and the RAQ test unit (used for Chariot testing). This test depended more on Internet availability as the pings traveled from UNL to the Internet, to Tachyon, and then to the Satellite and down.

The results through July 28, 2000 were as follows:

Tests from the host77 test computer running WHATSUP:

PC	ADEC Server
Uptime %	97.93 %
Avg. Delay	1174 ms.
Max. Delay	1249 ms.
Min. Delay	647 ms.

The delay times indicate the amount of time in milli-seconds, that it took the ping to travel from the host77 computer running WHATSUP to the ADEC server at Tachyon and back.

Tests from UNL Computer room WHATSUP monitor:

PC	ADEC Server	RAQ computer	host77
Uptime %	99.42 %	97.70 %	97.72 %
Avg. Delay	98 ms	1292 ms	1305 ms
Max. Delay	3836 ms	9774 ms	5487 ms
Min. Delay	60 ms	591 ms	587 ms

The delay times indicated above indicate the amount of time, in milli-seconds, that it took the ping to travel the route from the UNL main WHATSUP computer to the three listed computers, and back. The pings to the ADEC server in this case were not via the Satellite network, but via the Internet. The pings to the RAQ and host77 were via the Satellite.

2. Network Performance Tests:

Network Performance tests were conducted using a product called Chariot by NETIQ http://www.netiq.com/. The following is a brief description of the tests run:

Filesndl and Filesnds

These scripts emulated sending a file from Endpoint 1 to Endpoint 2, and getting a confirmation back. Filesndl sent more data per session than did the Filesnds. The default file size was 100,000 bytes.

POP3

This script emulated receiving a POP3 type mail file from Endpoint1 to Endpoint2. The default file size was 1000 bytes, with a 20 byte header. The default data type for the e-mail message was NEWS.CMP.

Realaudio

The Realaudio script emulated the RealAudio application that multicasted audio content from a multimedia CD-ROM. The send data rate defaulted to an average rate of 80kbps.

Realmedia

This script emulated a RealNetworks server streaming a combined audio and video file. The send data rate variable defaulted to an average of 300kbps.

(See Appendix 1 for the table associated with the following notes)

Notes on the Performance Tests:

- The Performance tests were conducted at different times of the day and on different days during the test period, in order to get a better overall view of the performance of the Tachyon network. Tests were generally performed during the 8-5 workday.
- Ten samples were taken of each test during the C1 service level, 6 for the C2 level, and 4 samples of each were taken during the C3 service level.
- The Average Transaction rate was the number of transactions completed per second.

Observations on the Performance Tests:

- The baseline numbers showed good throughout from the RAQ test computer to the ADEC server, in excess of 6 Mbps, nearly 8 transactions per second and very low response time.
- Throughput generally improved for the file sending tests, as the bandwidth increased.
- POP3 and Realaudio performed very well at all service levels.
- Relamedia performed much better at the C2 and C3 levels, as the lost data went from nearly 8% to less than 1 percent. This may be due to a Tachyon policy in effect at the C1 level.
- The Filesnd and POP3 tests are representations of actual transactions. At the

C1 level, the Filesnd tests used most of the available bandwidth, but at C2 and C3, they did not. This was most likely due to the transactional nature of the tests, that is, the latency caused by the satellite link most likely played a larger role.

- The realaudio test was set to stream at 80kbps (0.80 Mbps), thus the throughput did not increase at the higher service levels.

3. TTCP Throughput test results:

Test TCP (TTCP) is a sockets-based benchmarking tool for measuring TCP and UDP performance between two systems. More information on TTCP can be found at: **http://www.ccci.com/tools/ttcp/.**

(See Apendix 2 for results of this testing. The notes below are associated with this table.)

Observations and notes on the TTCP testing:

- Because no TTCP client was located on the ADEC server at Tachyon, one half of the testing environment was located at a UNL Internet connected computer. This may have introduced delays or slower data rates due the increased complexity.
- Eight TTCP tests were performed at each service level.
- At the lower service levels (C1 & C2), more of the download bandwidth could be used, but at the C3 (2M level, less throughput was seen, that is, only about 55% of the bandwidth was used. The exact cause of this is not known, but may have been due partially to the latency of the satellite, the Internet, or possibly other factors.
- The upload data rate, from the end location up to the satellite and down was very consistent.

B. General Test Results

Project summaries and state feedback were collected to provide the following summary.

FTP: File downloads worked very well across all service level. Small to medium size file uploads worked; however, as expected, large file uploads were problematic. This was due to a full 4MB TAP buffer coupled with the 256K return channel. Tachyon is looking for options to improve large file uploads.

E-MAIL: POP3 email worked very well, occasionally, latency affected the echoing of key strokes. IMAP e-mail was problematic at Maryland, less so at North Carolina State (unknown whether MD and NCSU were using the same version of IMAP). Tachyon intends to optimize for better performance.

WEB: As expected, Web applications worked well across all service levels.

REALNETWORK AUDIO/VIDEO: Audio and video streaming worked well across all service levels.

OTHER APPLICATIONS: H.323 applications did not function very well, but software and hardware configurations, and a lack of standards were factors. While chat, whiteboard applications worked, audio and video were problematic, especially when attempting multipoint conferencing. Slow performance was experienced when testing ICA thin clients. Tachyon has no plans to optimize the network to accommodate the application at this time. One state did successfully use a data conferencing application. Also, states accessed and tested many of their own Web applications and they worked fine.

Tachyon is working on a streaming video service that would work via the 256Kbps return channel. They expect the service to be available by the end of the year. Their business plan will include a metered rate.

XIV. Summary and Conclusions

From ADEC's perspective, the Tachyon technology worked as advertised. Tachyon was easy to work with, interested in feedback and very supportive of the test. Institutions did a good job of testing the network and providing feedback. Key applications worked. The test group believes that C1 level service is a viable product for remote areas with limited or no service. The group was impressed with system performance at the C2 and C3 levels. The test was successful and we are ready to move forward within the parameters described within the proposed NSF program.

From Tachyon's perspective, ADEC organized and managed operations well.

XV. Appendices

XVI. References

Additional attachments can be located at the following URLs:

ADEC/TACHYON TEST SERVER
http://63.103.96.228/

TACHYON GENERAL TESTING USER LOG

http://63.103.96.228/test/

MAIN STREET ECONOMIST
Center for the Study of Rural America - Federal Reserve Bank of Kansas City
http://www.kc.frb.org/RuralCenter/mainstreet/MainStMain.htm (May 2000 issue)

BUSINESS 2.0 - Milking the Net ...for all it's worth
http://www.business2.com/content/channels/technology/2000/06/13/12863

THE COOK REPORT ON INTERNET - Broadband Spread Spectrum Wireless Extends Internet Reach of ISP's and Field Research Scientists....
http://cookreport.com/09.04.shtml

APPENDIX 1

a. C1 (300k) service

Test	Avg. Throughput (Mbps)	Avg. Transaction Rate (#/sec)	Avg. Response Time (sec)	Lost Data %
Filesndl	.282	.358	2.79	na
Filesnds	.258	.322	3.10	na
POP3	0.004	0.398	2.51	na
Realaudio	0.080	na	na	0.03
Realmedia	0.276	na	na	7.78

b. C2 (800k) service

Test	Avg. Throughput (Mbps)	Avg. Transaction Rate (#/sec)	Avg. Response Time (sec)	Lost Data %
Filesndl	0.335	0.426	2.84	na
Filesnds	0.315	0.393	2.58	na
POP3	0.003	0.365	2.78	na
Realaudio	0.080	na	na	0.49
Realmedia	0.298	na	na	0.65

c. C3 (2M) service

Test	Avg. Throughput (Mbps)	Avg. Transaction Rate (#/sec)	Avg. Response Time (sec)	Lost Data %
Filesndl	0.395	0.502	1.99	na
Filesnds	0.337	0.422	2.37	na
POP3	0.003	0.387	2.58	na
Realaudio	0.080	na	na	0.00
Realmedia	0.300	na	na	0.024

APPENDIX 2

Service Level	Avg. data rate download (from satellite)	Avg. data rate upload (to satellite)
C1 (300k)	275.2k bps	239.9k bps
C2 (800k)	701.5k bps	239.7k bps
C3 (2M)	1093k bps	235.9k bps

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0045

Title: Who's Who, Who Isn't, What They Can Do, and How

Author: Gregory A. Jackson

Organization: University of Chicago

Year: 2000

Abstract: Network and data security require some mélange of identification, authentication, authorization, and encryption. Are these organizational, network, middleware, or application issues? Who should manage them? We'll talk about these questions, about various strategies for answering them, and about the tradeoffs between proprietary and open-standards approaches.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0066

Title: 2000 Annual Gartner-EDUCAUSE Update

Author: Michael R. Zastrocky

Organization: Gartner Group

Year: 2000

Abstract: Managing information resources in higher education requires the merging of institutional knowledge and broader technology and market information into a coherent, achievable strategy. This session will provide an update on trends and forces at work in information technology in higher education, and will present current data for this ongoing process in colleges and universities. Particular attention will be given to management issues facing higher education globally in the areas of e-learning and e-business; administrative applications and their interface with e-learning and portals; the continued labor shortage and what to do to resolve hiring and retention problems in higher ed; and organizational issues facing higher education.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0035
Title:	Campus Computing 2000: The National Survey of Information Technology in U.S. Higher Education
Author:	Kenneth C. Green
Organization:	The Campus Computing Project
Year:	2000
Abstract:	Begun in 1990, the Campus Computing Project is the largest continuing study of the role of IT in U.S. colleges and universities. This session will present the results of the 2000 Campus Computing Survey, conducted during summer 2000. The presentation will focus on key IT planning and policy issues, including e-commerce/e-services, campus portal strategies, user support issues, ISP services, strategic and financial planning, and other related issues.

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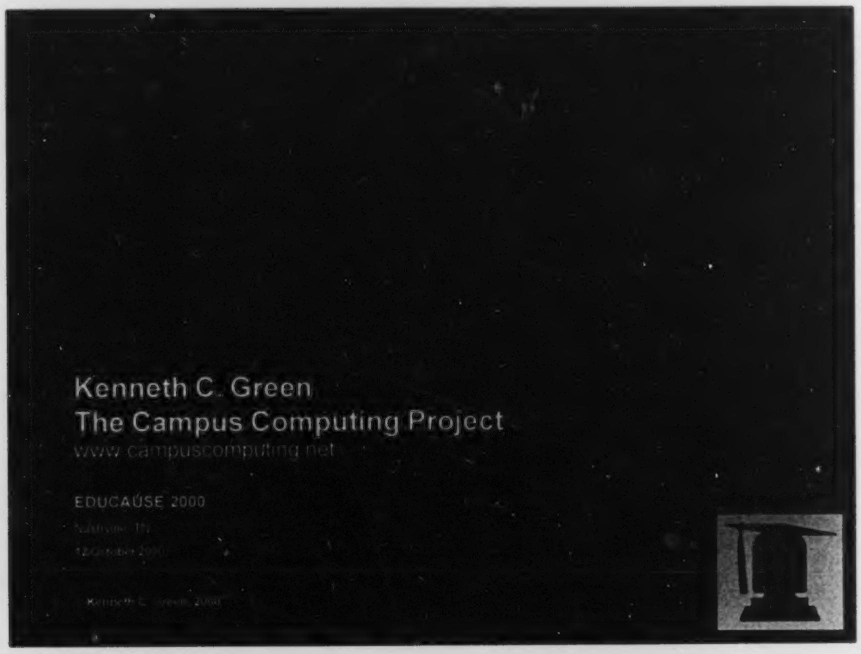
Kenenth C. Green



Kenneth C. Green
The Campus Computing Project
www.campuscomputing.net

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12 October 2000

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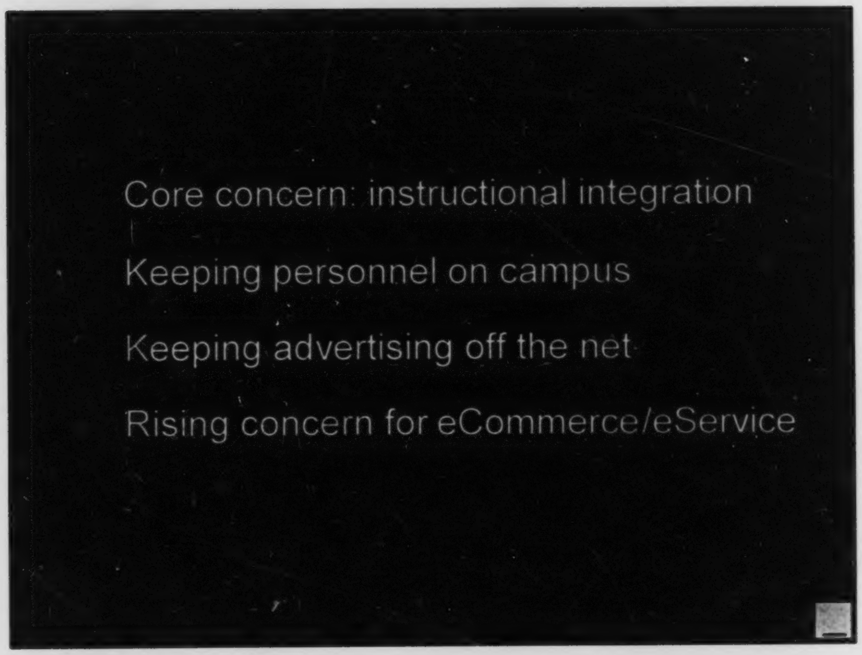

Core concern: instructional integration

Keeping personnel on campus

Keeping advertising off the net

Rising concern for eCommerce/eService

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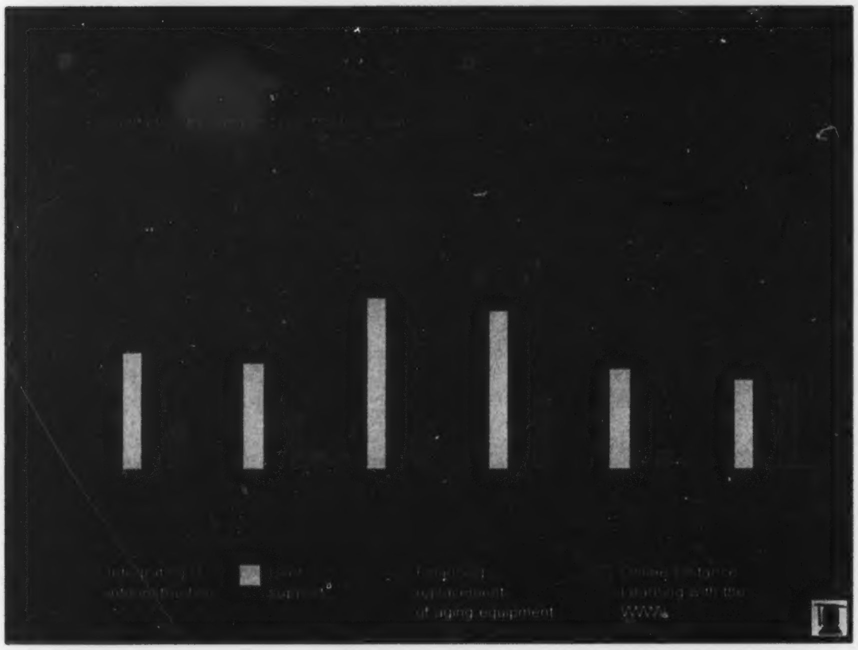

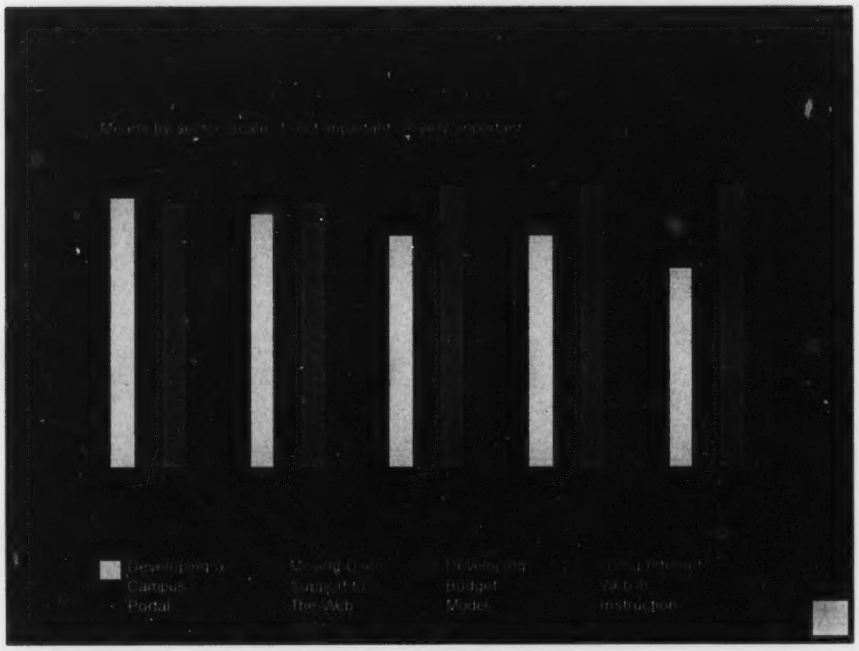

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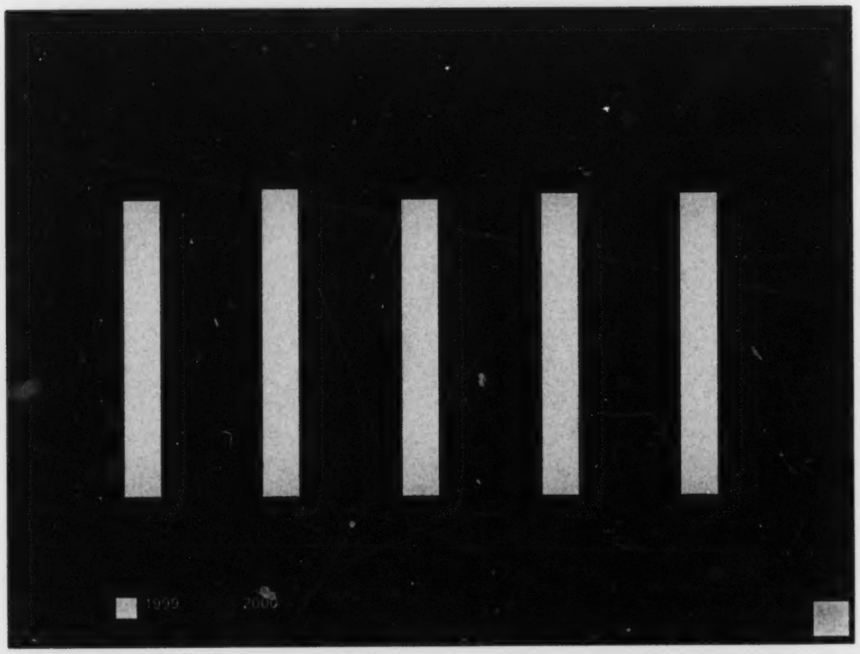

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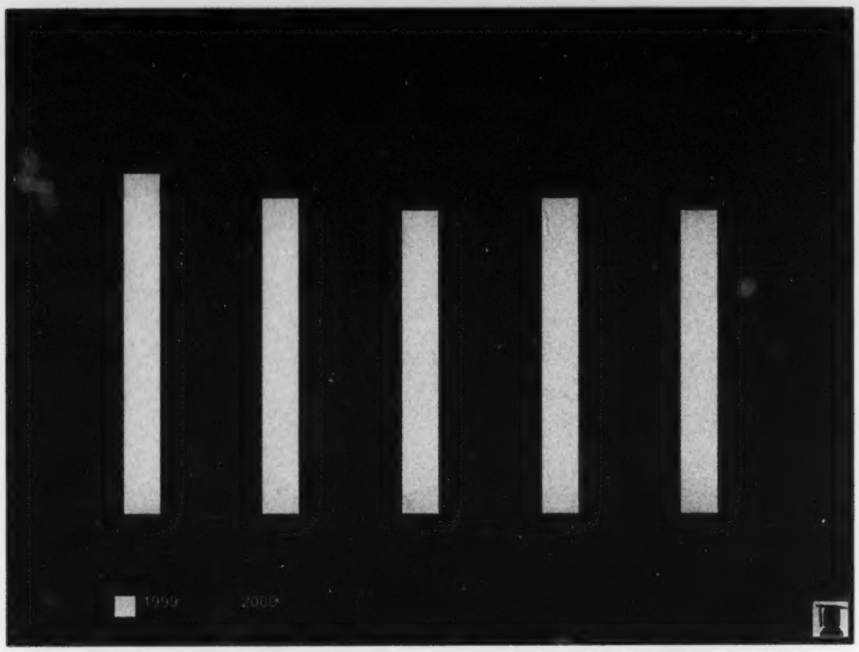

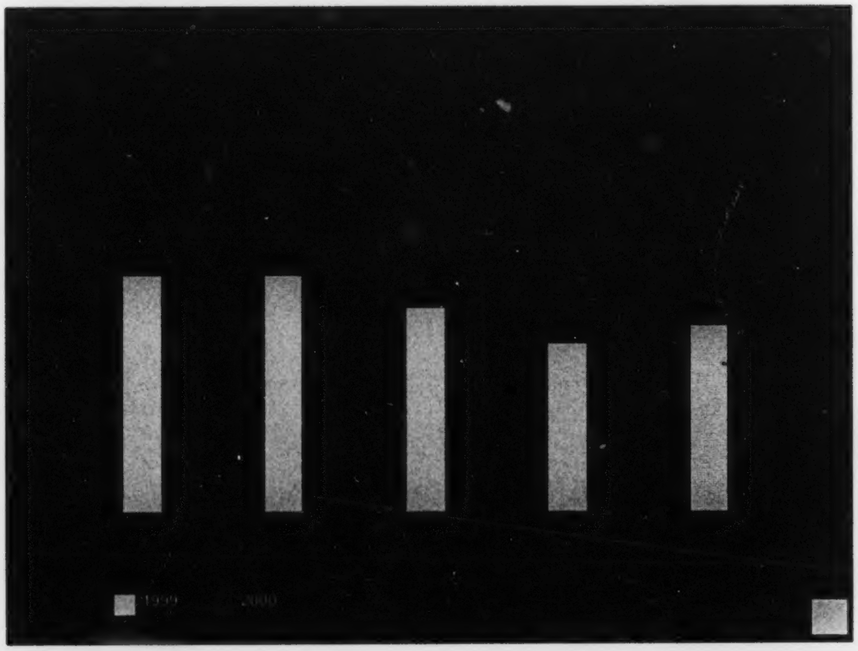

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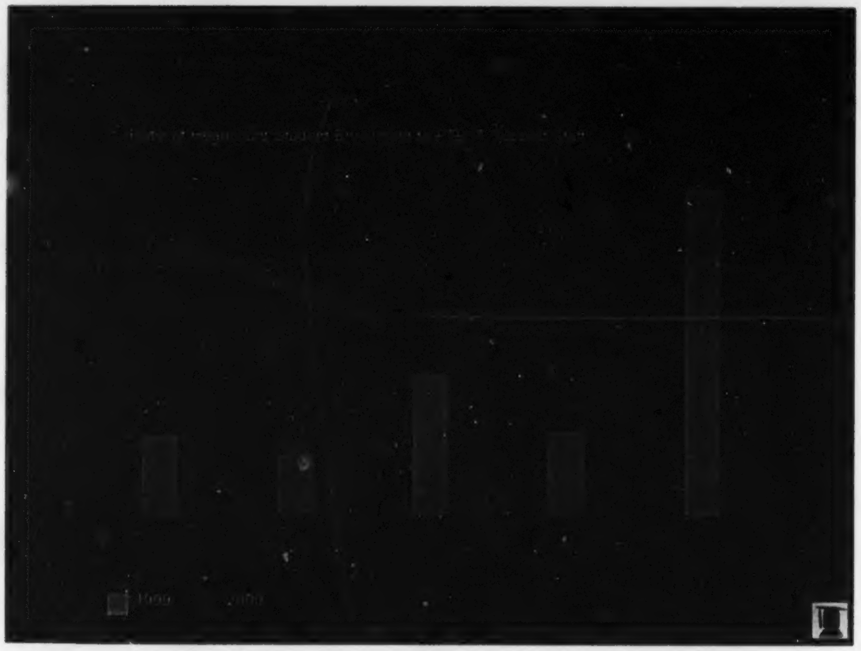

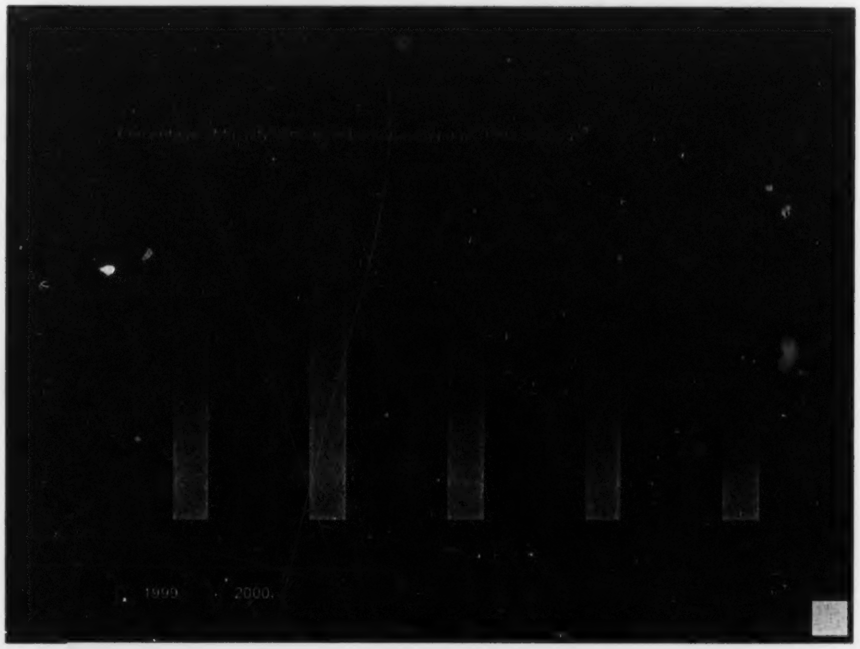

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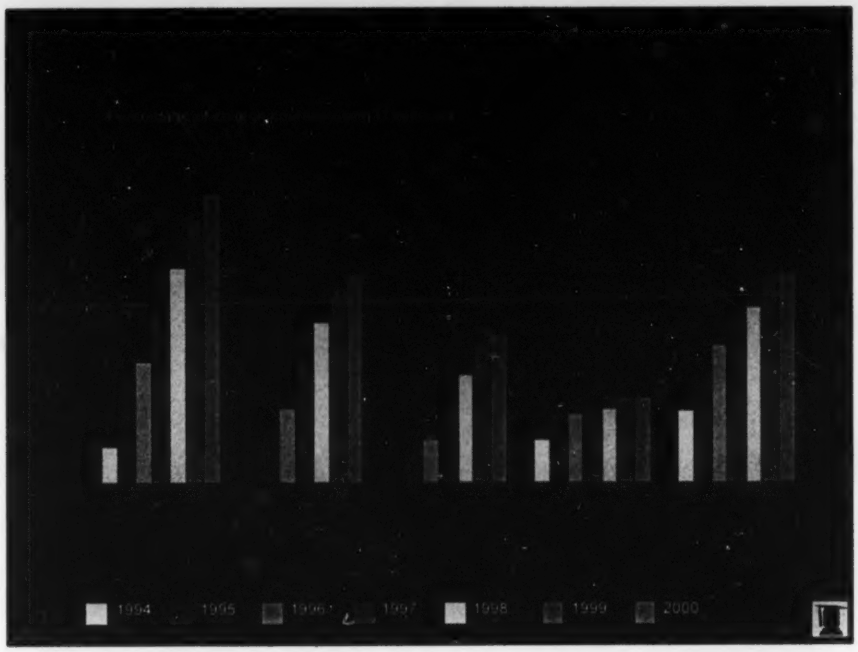

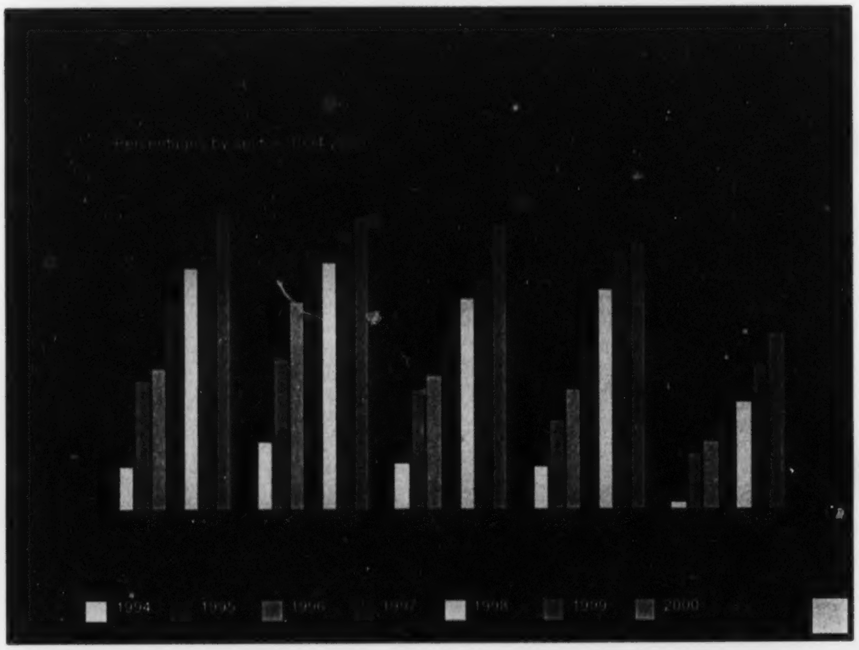

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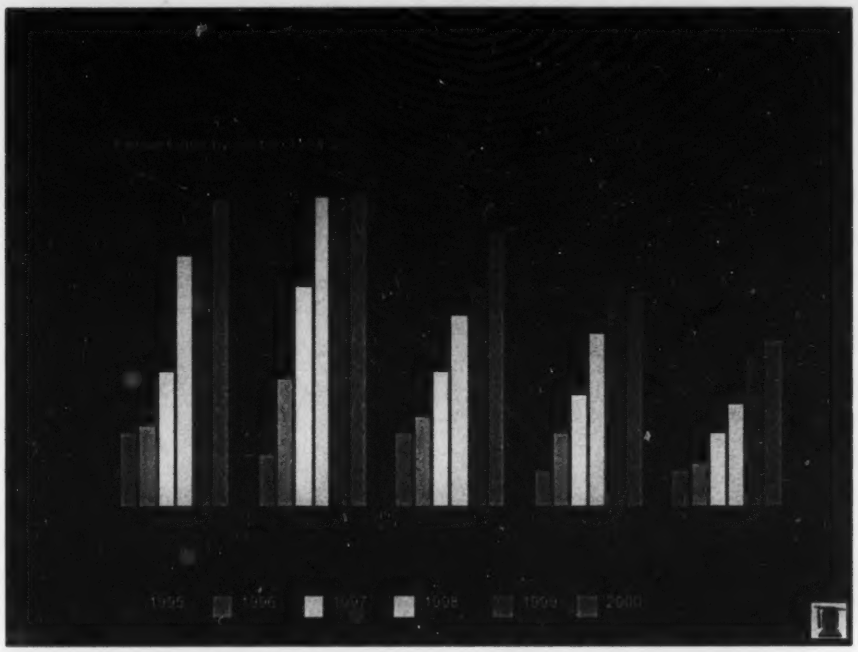

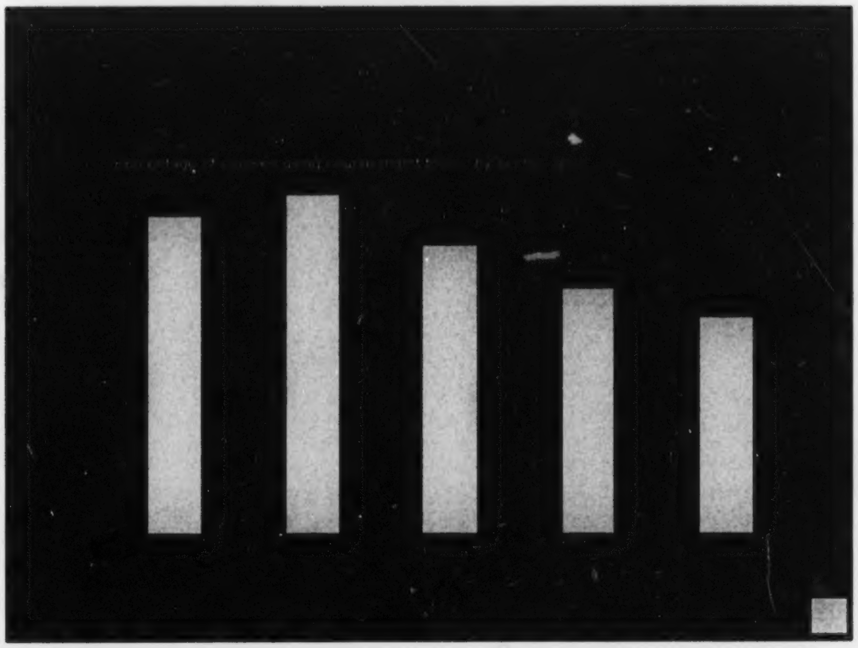

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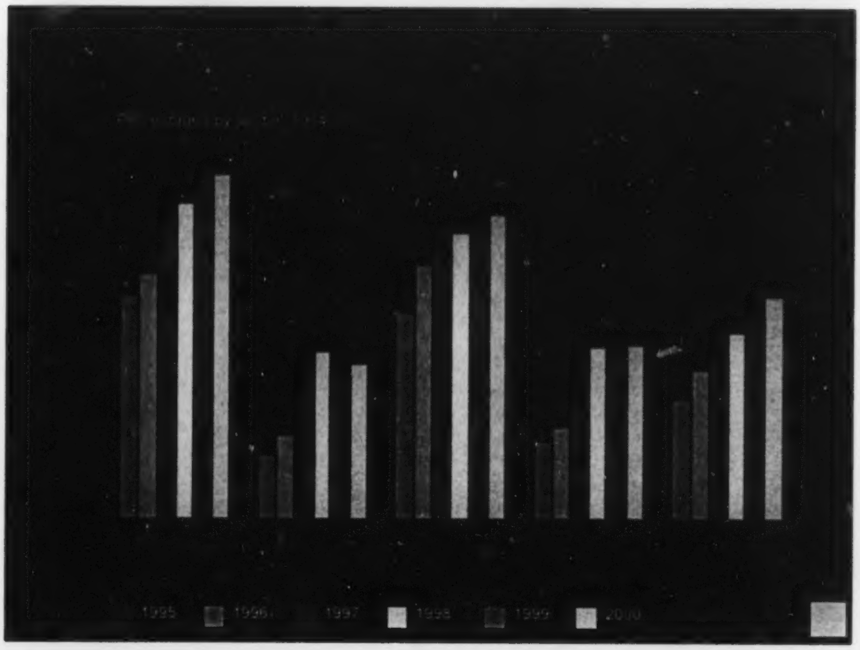
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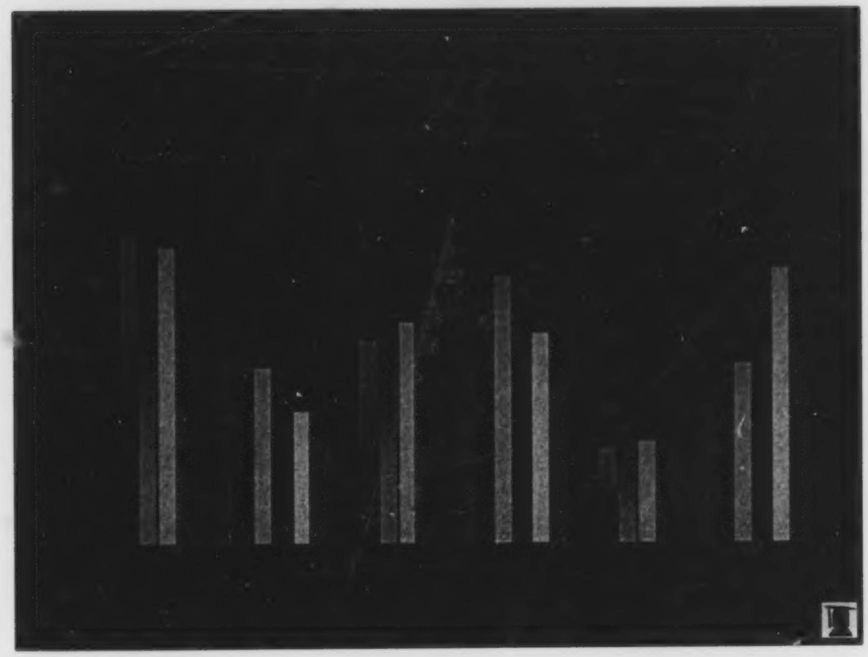

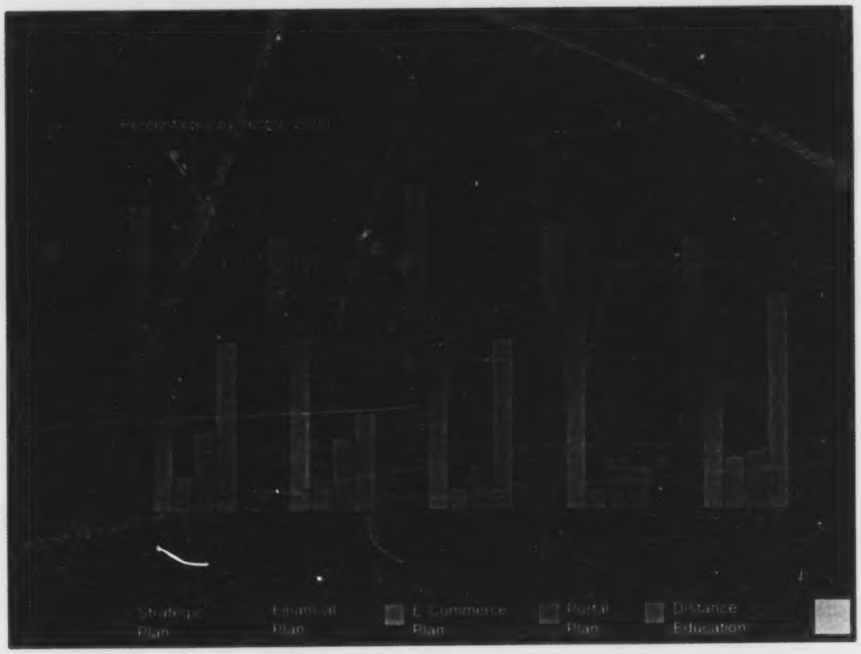

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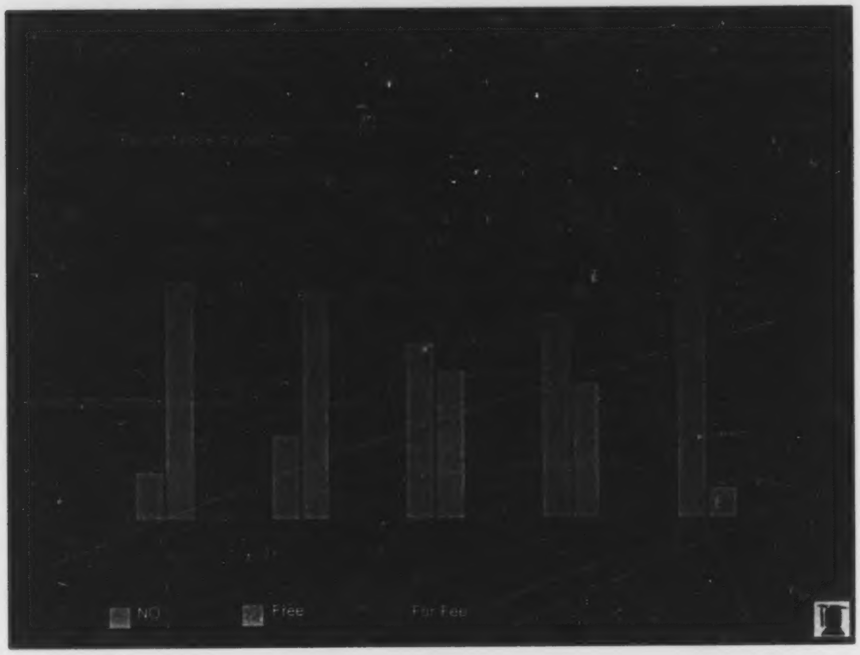

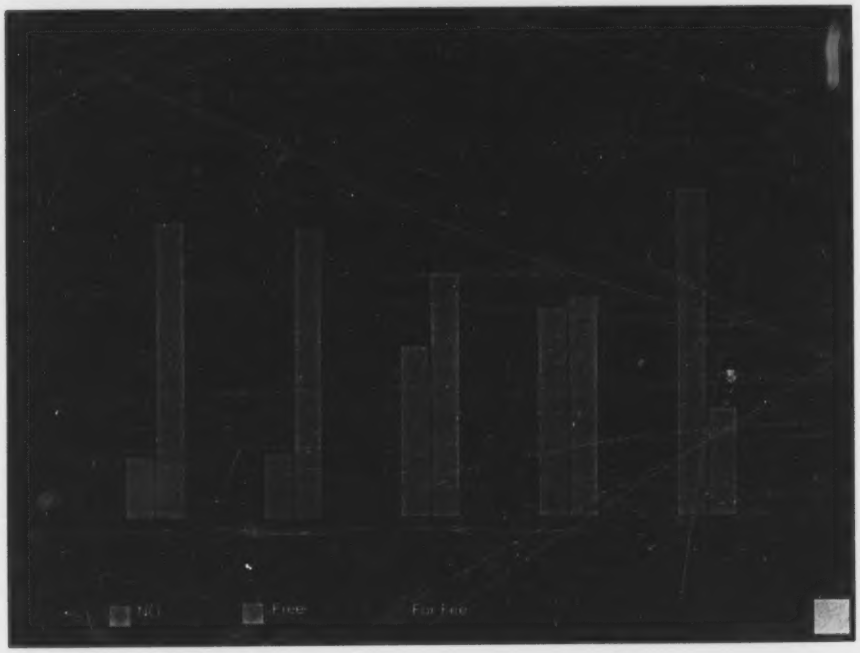

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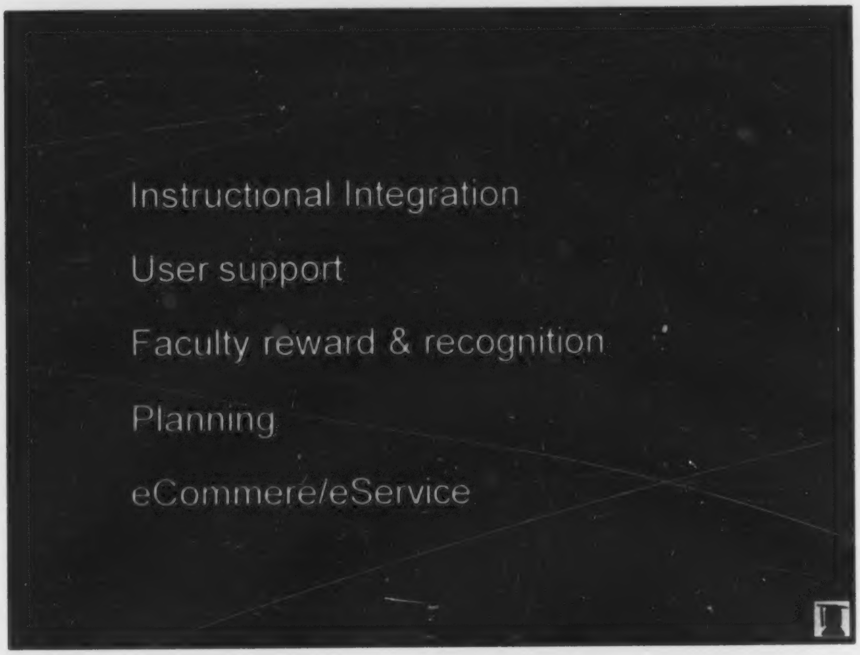


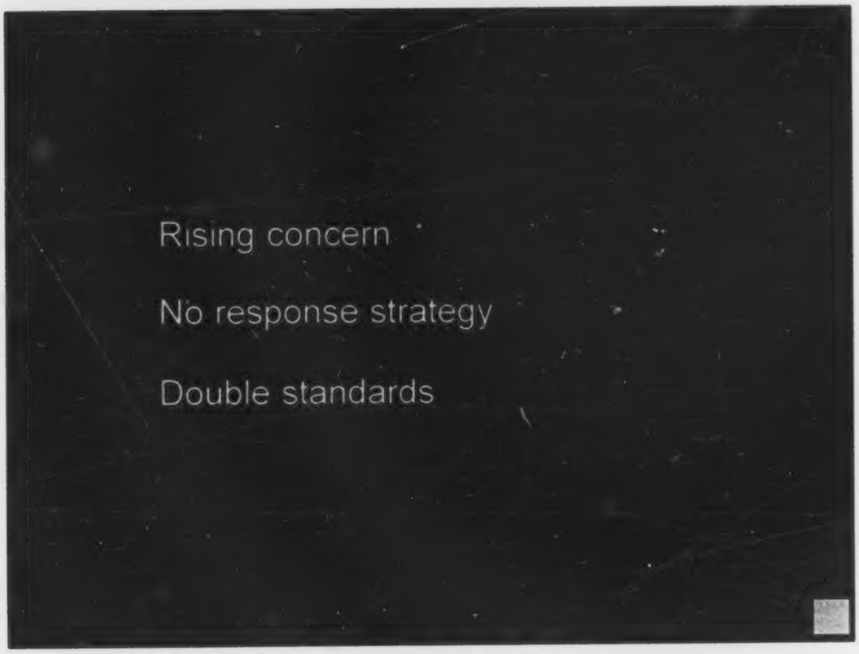
Instructional Integration

User support

Faculty reward & recognition

Planning

eCommere/eService



Rising concern

No response strategy

Double standards

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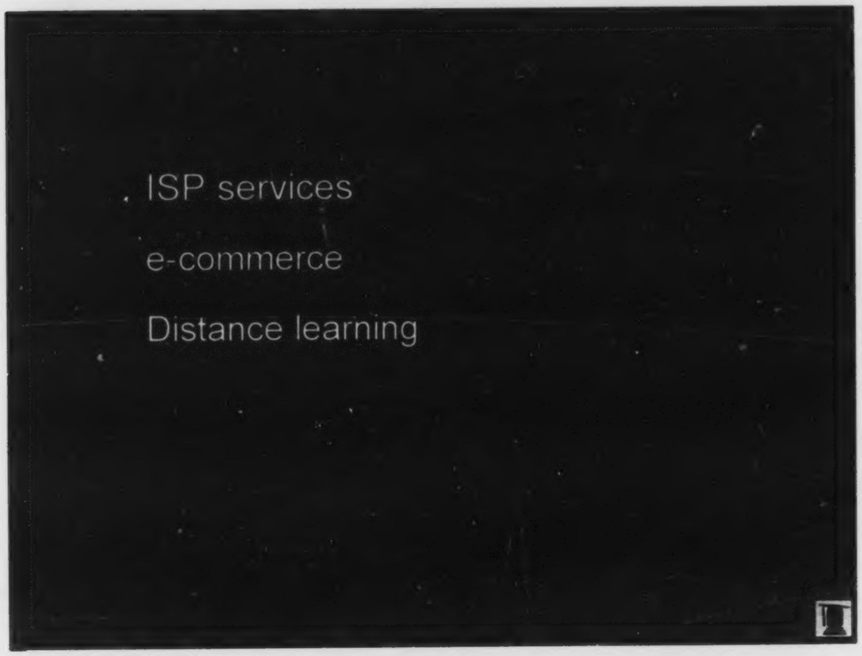
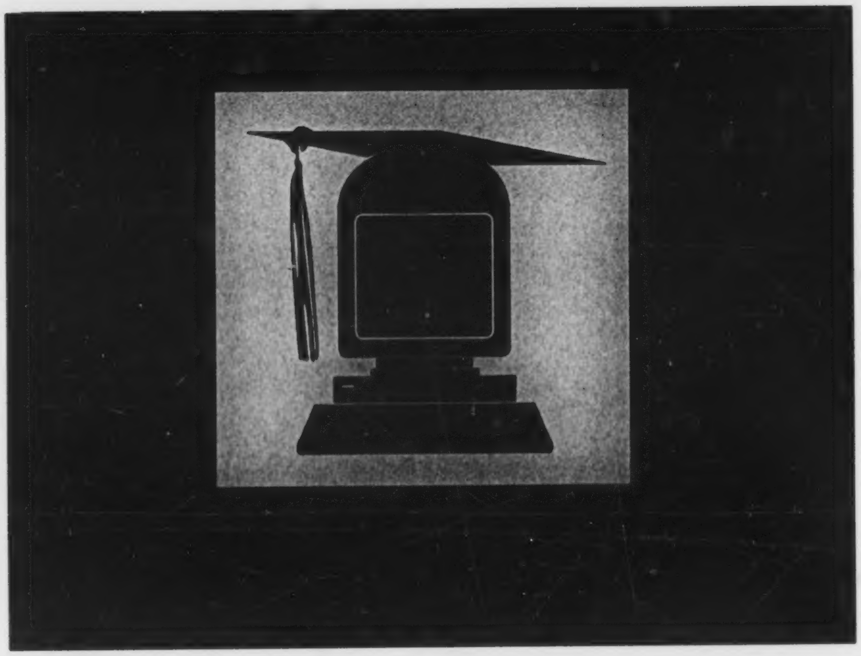


- ISP services
- e-commerce
- Distance learning



EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0060
Title:	Judy Estrin, General Session Speaker
Author:	Judy Estrin
Organization:	Packet Design, Inc
Year:	2000
Abstract:	Judy Estrin, a general session speaker, talks about the internets impact on all aspects of our life, from higher education infrastructure (distance learning) to electronic commerce and the way we do daily business.

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Constituent & Discussion Groups

Transforming Education Through Information Technologies

Constituent groups (CGs) and electronic discussion groups are initiated by individuals among the membership who want focused communication with colleagues sharing common concerns.

Most constituent groups conduct discussions throughout the year via electronic discussion lists. To subscribe or unsubscribe, you may either use the Web form accessible from the pages of the individual groups, or send e-mail to LISTSERV@LISTSERV.EDUCAUSE.EDU containing the one-line message SUBSCRIBE <listname> <your name>.

To send a message to the list (once you are subscribed), send e-mail to <listname>@LISTSERV.EDUCAUSE.EDU

For background information, see the Program Description and the electronic discussion list Participation Guidelines.

List names are in parentheses below.

Groups for institutions of a specific size or type

- edACCESS (ACCESS) – schools under 1,000 FTE
- Community Colleges (CC)
- IT Collaboration within State Systems (STATESYSTEMS)
- Large Campus Change (LARGECAMPUS)
- Small Colleges (SMALLCOL) – colleges under 5,000 FTE

Groups which focus on specific professional interests

- Administrative Systems Management (ASM)
- Chief Information Officers (CIO)
- Data Administration (DASIG)
- Decision Support/Data Warehousing (DS)
- Electronic Records Management (E-RECORDS)
- Gartner Issues (GARTNERCG)
- Intranet Applications (INTRANET)
- Change Leadership (LEADERSHIP)
- Library/IT Partnerships (LIBIT)
- Multimedia (MULTIMEDIA)
- Net Improvement (NETIMPROV)
- Network Management (NETMAN)
- Policy Issues (POLICY)
- Project Management Constituent Group (PROJECT)
- Registrar Constituent Group (REG)
- Software Licensing Issues (LICENSING)
- Teaching and Learning (TL)
- User Services (USERSERV)
- Users of PeopleSoft Applications (PSEDU-L)
- Web Administrators (WEB)

Archived Discussions

- Distributed Learning (incorporated into Teaching & Learning group discussions as of 7/00)
- Electronic Mail
- Year 2000 Issues

Contact: cg@educause.edu

EDUCAUSE 2000 PROCEEDINGS

EDUCAUSE 2000 HOMEPAGE

EDUCAUSE 2000 October 10-13

PROGRAM • REGISTRATION • CORPORATE PARTICIPATION • HOTEL & TRAVEL

Nashville

Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Constituent Group Meetings

Chief Information Officers (First Session)
Constituent Group
Tuesday, October 10
1:30 p.m. - 4:00 p.m.
Polk A

- Barbara H. Horgan, Director of Information Technology, University of Washington-Tacoma 👤

This Constituent Group session will focus on issues and challenges that affect chief information officers in higher education: the role of the CIO, financing and funding strategies, planning and organizing for information resources (especially information technology) within the institution, human resource issues, policies for the networked information environment, and the future of higher education. A follow-up session will be held during Thursday lunch.

Users of PeopleSoft Applications (Current Users)
Constituent Group
Tuesday, October 10
3:00 p.m. - 4:30 p.m.
Polk B

- Jean Fruth, Director, Administrative Computing, Weber State University

This session will provide current users of PeopleSoft applications an opportunity to discuss evaluation, development, implementation, and operation in higher education and non-profit institutions. Participants will share experiences and discuss issues of mutual interest such as integration, security, reengineering processes and workflow, customization, performance and network implications, and reporting/data warehouse options and implications. A session for new or prospective users is scheduled for Wednesday at 4:45 p.m.

Data Administration (First Session)
Constituent Group
Tuesday, October 10
4:00 p.m. - 6:00 p.m.
Sevier C

- Ronald K. Spangler, Data Administrator, University Management Information, University of Kansas

The Data Administration Constituent Group focuses on data administration and metadata, This session will provide an opportunity to discuss current issues and share ideas in four areas: (1) the management of data, including policies, procedures, and standards; (2) the methods and tools used to provide access to metadata; (3) resources and examples for data administrators; and (4) tips on organizing the data administration function. A follow-up session is scheduled for Wednesday at 4:45 p.m.

Administrative and Campus Computing Environments at Small Schools (ACCESS) (FTE <1,000)
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Lincoln B

- Susan G. Riederer, Chief Information Officer, The Lawrenceville

School

ACCESS is an informal association of small colleges and secondary schools, with its own annual conference, listserv, and Web page. The associated EDUCAUSE Constituent Group meets at this conference to discuss and share information that is particular to smaller institutions. This session will focus on administrative software packages, policies on computer use, dormitory and remote access, technology financial strategies, staffing and organizational models, technology and curriculum integration.

Administrative Systems Management
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Johnson A

- Eric Bird, Director of Information Technology, Boston Architectural Center
- Kevin Shalla, Manager, Computing & Networking Services, Illinois Institute of Technology

The ASM Constituent Group discusses the types of issues managers encounter in selecting, planning, implementing, managing, and decommissioning administrative systems. The meeting will focus on such subjects as selection procedures and product reviews of administrative systems; surveying membership on production systems and evaluation thereof; retraining staff to use new programming tools and techniques; using SSNs for keys, and moving away from them; improving reporting (data marts, tools, middleware, success stories); Web access for students and others. (No corporate representatives please.)

Decision Support/ Data Warehousing (First Session)
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Lincoln C

- Barbara Hope, Director, Data Administration and Data Architecture, University of Maryland

This Constituent Group discusses organizational and technological problems, issues, tools, and solutions for managerial decision-making, strategic planning, and information reporting. The goal is for members to share with their colleagues lessons learned and best practices in decision-support tools and processes. Decision support is broadly defined, and includes topics on EIS, data warehousing, data mining, data marts, and OLAP. Come share the "good, bad, and ugly" with other information professionals. A follow-up session is scheduled for Thursday at 4:45 p.m.

IT Collaboration in State Systems
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Natchez

- Ruth Carlson Robertson, Associate Vice Chancellor, Academic Affairs, University System of Maryland

This meeting will allow sharing of perspectives about providing technology services for state systems of higher education institutions, focusing on ways in which collaboration can add value or reduce costs. It should be of interest to directors or managers of information technology for state systems, persons responsible for coordinating statewide networks, directors of distance learning coalitions, and persons who manage information for coalitions of colleges or universities.

Registrars
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Johnson B

- Jeff von Munkwitz-Smith, University Registrar, University of Connecticut

This informal meeting of higher education registrars focuses on the ways in which information technologies affect registrar's office operations, including software selection, staff training, standards and best practices, record-keeping and access issues, data storage and retrieval.

Software Licensing
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Augusta

- Nazareno L. Rapagnani, Assistant Provost, Information Technologies, University of Notre Dame

This EDUCAUSE Constituent Group focuses on the issues involved in blending the corporate interests of software providers with the unique software licensing needs of higher education institutions. Among the challenges are institutional environments in which many users need to use different computers in more than one venue (public lab, dorm room, office, home, research lab), and user identities and software needs that change from one semester to the next as students move in and out of institutions and change courses. Discussion may focus on how best to come to consensus on higher education's needs and how to formulate a position we can all take to software providers.

User Services
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Cleveland B

- Carolyn Livingston, Manager, Financial Systems, Tufts University
- Tracy Scharer, Manager, Business Information Services, University of Virginia

This Constituent Group meeting will focus on the problems and solutions encountered in meeting the expanding technical needs of faculty, staff, and students -- staffing, training, help-desk issues, and hardware and software standards. Learn how these challenges are being met at other institutions, and exchange ideas and business cards.

Library/IT Partnerships
Constituent Group
Wednesday, October 11
12:45 p.m. - 2:15 p.m.
Vicksburg

- Malcolm B. Brown, Director of Academic Computing, Dartmouth College
- Daniel Keith Marmion, Associate Director for Information Systems & Access, University of Notre Dame

As more information is accessible through campus-wide networks, management of information resources often becomes a shared responsibility of librarians and information technologists. This Constituent Group provides a forum for discussing management issues and sharing experiences about such collaborative efforts. Areas of interest include human resource practices and policies, financial and budget issues, the influence of institutional culture on collaborations, organizational issues, overcoming barriers to partnerships, and areas of potential partnerships, including education and training, working with information providers, delivering services, providing support for instructional technology and multimedia, and campus-wide information systems.

Data Administration (Follow-up)
Constituent Group
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Sevier C

- Ronald K. Spangler, Data Administrator, University Management Information, University of Kansas

The Data Administration Constituent Group focuses on data administration and metadata. This session will provide an opportunity to discuss current issues and share ideas in four areas: (1) the management of data, including policies, procedures, and standards; (2) the methods and tools used to provide access to metadata; (3) resources and examples for data administrators; and (4) tips on organizing the data administration function. It is an informal follow-up to the Data Administration meeting on Tuesday at 4:00.

Gartner Group Issues
Constituent Group
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Johnson B

- Douglas E. Hurley, Director, University Relations, Gartner Inc.

This constituent group provides a forum to discuss the hot topics facing higher education today, where Gartner Group should focus its research, and how Gartner's research and consulting services can help institutions understand and anticipate the challenges confronting higher education in the 21st century. More information about the EDUCAUSE/Gartner Group relationship and Gartner services is available from the EDUCAUSE home page. The group is open to all EDUCAUSE members. Representatives from Gartner Group will attend this session.

Network Improvement
Constituent Group
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Sam Houston

- James E. Williams, Consultant, EDUCAUSE

This new Constituent Group focuses on challenges and solutions of advancing networking for institutions that are behind the leading edge of network technology. Issues discussed range from solutions for connecting a campus to the Internet, to cost barriers, to re-wiring a campus. If you're not connected at warp speed and don't know how to get there, you will probably find the discussions useful in maximizing and leveraging your network investment.

Small Colleges (under 5,000 FTE) (First Session)
Constituent Group
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Bayou C&D

- Clyde R. Wolford, Director of Information Technology, Le Moyne College

This year's meeting of the Small Colleges Constituent Group will once again focus on sharing strategies used to strengthen and expand effective utilization of information resources on campuses. Particular attention will be devoted to exploring attendees' successful solutions for managing these rapidly expanding resources, and identifying current issues. Discussion will continue at a Thursday lunch follow-up session. This is always a well-attended session with great people -- come with your questions and answers.

Users of PeopleSoft Applications (New and Prospective Users)
Constituent Group
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Bayou A&B

- Jean Fruth, Director, Administrative Computing, Weber State University

This informal session will provide new and prospective users of PeopleSoft applications with an opportunity to discuss evaluation, development, implementation, and operation in higher education and non-profit institutions. Participants will share experiences, opportunities, and concerns, and will discuss issues of mutual interest such as integration, security, reengineering processes and workflow, customization, performance and network implications, and reporting/data warehouse options and implications. A session for current users is scheduled for Tuesday afternoon at 3:00.

Chief Information Officers (Follow-up)
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Sevier D

- Barbara H. Horgan, Director of Information Technology, University of Washington-Tacoma 👤

This informal session is a follow-up of the extended CIO Constituent Group meeting held Tuesday afternoon at 1:30. It will focus on issues relevant to CIOs in higher education. You do not have to attend the Tuesday session to participate.

Community Colleges
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Lincoln C

- Joseph C. Miragliotta, Manager, Planning & Emerging Technology, College of DuPage

This session will provide an opportunity for community college IT professionals to discuss major issues and solutions affecting their environment such as technology planning, staffing, and responding to unique market demands. Conversation will also address what EDUCAUSE could do for community colleges, including how best to use this Constituent Group.

Electronic Records Management
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Augusta

- Susan Thornton, Computer Consultant, East Carolina University

This informal session will address the record-keeping problems posed as activities of colleges and universities move from paper to electronic formats. How do we manage this explosion of electronic records, both traditional structured data and unstructured information such as e-mail and Web documents? How can we make sure that the information we need exists, and is retrievable, in 10, 20, or 100 years?

Intranet Applications
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Johnson A

- Stephen Patrick, Director, Computing Services, Bradley University

This Constituent Group session will focus on the use of intranet tools (Web browsers) to provide access to administrative data and serve other campus needs. Issues will include development tools, security, and performance.

Multimedia
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Vicksburg

- Laura Joyce Moriarty, Business Analyst, Emory University

Multimedia is Coming... Get Ready! This Constituent Group focuses on the complicated, resource-intensive demands of new multimedia technologies on campus. In the May-June issue of _Educause Review_ Ira Fuchs, former vice president for computing & IT at Princeton University, wrote, "I predict that within the next six to eighteen months, virtually every machine that your students buy or bring to school will have a built-in video camera." It wouldn't take many of these users to saturate most campus networks. Is your bandwidth ready? Are you going to lay down a skimpy-use law? See what Princeton has done to tackle this expectation, and bring your own point of view to this session.

Project Management
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Natchez

- Deborah A. Lauriano, Associate Director, Information Resources, University of California, Davis

This EDUCAUSE Constituent Group focuses on issues faced by project managers of technical projects within higher education, such as best practices and tools, promotion of project management culture in IT organizations, managing cross-functional groups, managing the introduction of new technologies, and meeting client expectations.

Teaching and Learning
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Cleveland A

- Jacqueline Brown, Associate Vice Provost for Learning Technologies, University of Washington
- Nikki E. Reynolds, Director, Instructional Technology Services, Hamilton College
- Ruth M. Sabean, Assistant Provost, Educational Tech, University of California, Los Angeles

After several decades of seemingly unfulfilled promises, IT has become the catalyst for significant changes to the educational process. Indeed, many would say that IT is redefining the roles of students, teachers, and traditional educational institutions. The new Teaching and Learning Constituent Group provides a forum for the exchange and archiving of information and for discussions of key issues relating to the policies and practices of deploying IT in teaching and learning across the spectrum of instructional venues from the most traditional to those which focus exclusively on distance learning. Please join us at this inaugural meeting to help identify highest priority needs -- policy, technical, legal -- of instructional technology support providers.

Small Colleges Follow-up Session (under 5,000 FTE)
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.
Cleveland B

- Clyde R. Wolford, Director of Information Technology, Le Moyne College

This is a follow-up to the Wednesday 4:45 meeting of the Small College Constituent Group, which focuses on sharing strategies to strengthen and develop effective management of information resources at smaller institutions. Discussion will focus on key issues identified during the Wednesday meeting. Anyone is invited to participate, whether or not they attended the earlier session.

Web Administrators
Constituent Group
Thursday, October 12
12:45 p.m. - 2:15 p.m.

Madison

- Christopher Connolly, Assistant Director, WWW, University IT, Villanova University

This session will focus on the use of the Web as both a productivity and a public relations tool for institutions. Topics of discussion may include Web site design, development, and maintenance; policy issues; training, templates, and support for Web page publishers; site consistency and cohesiveness; and providing Web-based services for employees and students. Designed for Webmasters, project managers, administrators, designers, and others who are responsible for their institution's Web presence.

Network Management
Constituent Group
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Sam Houston

- William Betlej, Director, Computer & Information Services, Mary Baldwin College
- Stu Warford, Director, Telecommunications Services, Pepperdine University

This EDUCAUSE Constituent Group provides interested higher education professionals with an opportunity to share ideas and concerns about managing and supporting networks, including the expanding area of wireless networks. Topics include new technologies, hardware and software standards, user support.

Policy Issues
Constituent Group
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Sevier C

- Steven L. Worona, Director of Policy and Networking Programs, EDUCAUSE

This Constituent Group focuses on the common policy issues -- both legal and ethical -- that arise on campus from the use of networked computers and information. Examples include harassment, pornography, privacy of records, commerce, and copyright and intellectual ownership. Depending on interests of participants, discussion might include development of policies, appropriate institutional responses to issues, and separating emotional aspects from legal and ethical responsibilities.

Decision Support/ Data Warehousing (Follow-up Session)
Constituent Group
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Browning A

- Barbara Hope, Director, Data Administration and Data Architecture, University of Maryland

This follow-up session from a Wednesday lunch meeting will focus on organizational and technological problems, issues, tools, and solutions for managerial decision-making, strategic planning, and information reporting. Participants do not have to attended the earlier session.

Click on this icon to see the presenter's biographical information.

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EDUCAUSE 2000 PROCEEDINGS

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EDUCAUSE 2000 October 10-13

PROGRAM • REGISTRATION • CORPORATE PARTICIPATION • HOTEL & TRAVEL

Nashville

Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Current Issues Roundtables

Advanced Networking: How Much is Enough?
Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Augusta

- Philip E. Long, Director, Information Technology Services, Yale University

College campuses are among the nation's most wired environments in support of teaching and learning. But few networks can reliably deliver comprehensive media for classroom and study use and competition is increasing from non-educational uses such as Napster. We are now adding advanced services such as multicast video and developing wireless LAN environments and many students have data cell phones, pagers and more. How much is enough? Can this fit together? Where are we headed? *Roundtable sessions are limited to 20 participants.*

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0072

Copyright Infringement Issues
Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Cleveland A

- Rodney J. Petersen, Director, Policy and Planning, Office of Information Technology, University of Maryland

Digital technologies presents challenging legal and ethical issues regarding the appropriate use of copyrighted materials. What are the types of infringing uses being reported to University administrators? What challenges do Napster and similar applications pose? What policies or procedures should be in place? What uses are appropriate under the law or campus policy? What is the institution's exposure to liability? Join us for a lively exchange of information, approaches, strategies, and more. *Roundtable sessions are limited to 20 participants.*

Digital Libraries: Progress and Challenges
Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Cleveland B

- Rodney N. Henshaw, Dean, Cowles Library, Drake University

Is the development of a completely digital academic library inevitable, or merely a theoretical possibility? Is a purely digital library even desirable, or will it jeopardize access to the scholarly record? While librarians have made major progress over the last decade in developing electronic access tools and resources, the continued evolution of digital libraries is not assured. Significant technical, service, fiscal, legal, social, and political barriers may impede or delay further development. This roundtable will help equip participants with an up to date over view of the current state of digital library programs, and an awareness of emerging trends and directions. What has been accomplished? What are specific issues that must be addressed to insure continued progress? Participants will be encouraged to share successes and failures at their home institutions.
Roundtable sessions are limited to 20 participants.

Electronic Classrooms and Buildings of the Future

Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Natchez

- Elia Schoomer, Team Leader, Instructional Technology Support Services, Lehigh University

How many universities and colleges have adequate high technology classrooms and student learning spaces to meet current demands ? With the exponential growth in the use of the Internet and multimedia to support enhanced instructional delivery, student learning, and research; there never seems to be enough high technology facilities available to meet the needs of faculty and students. A critical issue facing our campuses is planning, developing, and supporting new high technology facilities to meet critical demand for teaching innovation, research, and student learning. This session will examine and discuss current issues, problems, and trends related to developing and supporting new high technology classrooms, labs and student learning spaces.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0074

Electronic Learning Environments: Assessing Educational Outcomes

Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Jefferson B

- Scott Macklin, Director, PETTT, University of Washington

Science and industry are exponentially improving the methods by which information can be collected, assembled, edited, upgraded, archived, displayed, distributed, and accessed interactively. In what ways can the progressive innovations in information technology enhance the outcomes of our educational efforts? Join us for a session for a discussion concerning assessment strategies regarding teaching and learning with technology.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0081

Engaging and Supporting Faculty Use of Technology: From Boutique to Mainstream

Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Cleveland B

- Paul R. Hagner, Senior Advisor for Technology Planning & Assessment, University of Hartford

It is hypothesized that there are four faculty "types" in the area of learning transformation: Entrepreneurs, Risk-Adversives, Incentive Demanders, and Refusers. Our discussion deals with the validity of these "types" and how each presents different transformation challenges.
Roundtable sessions are limited to 20 participants.

Enterprise Information Portals

Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Cleveland B

- David W. Koehler, Director, Information Systems, Princeton University

Portals have certainly hit the issue list in a big way. Everyone seems to be planning or implementing a portal. What do you need to know to be successful? What's all the hype

about anyway? Does your campus work best with the free model, or by buying the tools to implement or by developing your own? What's the story on the shareware portals from Java SIG and Apache? Do you expect to have one portal or many on your campus? What are the architectural considerations to enable portals on your campus?
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0077

From Web Site to Portal: Technical Challenges

Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Cleveland A

- Christopher Connolly, Assistant Director, WWW, University IT, Villanova University

There are many technical issues that must be confronted to effectively move from a static web site to a portal. In-house development vs. commercial, centralized usernames and passwords, centralized information, e-mail and new technologies are many of the challenges that must be met. At this roundtable, we'll identify the issues universities have faced and discuss how new technologies, such as XML and Java Messaging Service may ease the integration process.
Roundtable sessions are limited to 20 participants.

Wireless Networking: What Role Will It Play in Your Campus's Future?

Current Issues Roundtable
Wednesday, October 11
4:45 p.m. - 6:00 p.m.
Vicksburg

- Dewitt Latimer, Director, Statewide IT Infrastructure, University of Tennessee

Wireless technologies represent a rapidly emerging area of interest in higher education. Are we chasing yet another Holly Grail or can it fundamentally enhance the business we are in? This roundtable will explore specific examples of how campuses are deploying wireless as well as the plethora of implementation issues such ubiquitous untethered access brings.
Roundtable sessions are limited to 20 participants.

E-Business: Is It Any Less Complex in a Small College?

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Charleston Boardroom

- Barbara E. McMullen, Director of E-Commerce Initiatives, Marist College

Conducting college business electronically impacts operating efficiency, the value of education, and competitive advantage. After ensuring a common vocabulary, participants brainstorm on what colleges can do short- and long-term with e-business strategies. The focus is on complexities that hamper deployment, what can be accomplished, the potential, and barriers to success.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0078

Distance Education: How Do You Know It's Right for Your Campus?

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Cleveland B

- Ellen Y. Borkowski, Director, Technology Enhanced Learning, University of Maryland

Universities and businesses alike are "going online." How do you determine whether or not your institution should move to distance education? Large or small, public or private -- what issues should be examined in making this decision? Join us for a session to discuss and share experiences and questions around making the decision to go or not to go into distance education.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0080

From Web Site to Portal: Organizational Challenges
Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Augusta

- Darrel S. Huish, Asst. Vice Provost, Applications and Consulting, Arizona State University

The opportunity to use a portal to extend the functionality of the internet is generating intrigue and gaining acceptance within higher education. Often the challenges to a successful portal project are not only the technical or business issues, but also the organizational ones. This roundtable will explore the associated organizational issues.
Roundtable sessions are limited to 20 participants.

Funding IT: When Does Outsourcing Make Sense?
Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Vicksburg

- S. Alan McCord, Senior Director IT Planning and Coordination, University of Michigan-Ann Arbor

Many institutions struggle with funding IT infrastructure, services, and strategic projects. Outsourcing can address both service delivery and funding, but care must be exercised to find outsourcing opportunities that best match institutions to vendors. At this roundtable, participants will explore the advantages and disadvantages of outsourcing, and will share their experiences in selecting and administering outsourcing relationships.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0073

E-Business: Challenges in the Research University
Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Natchez

- Jennifer T. Cobb, Manager, Strategic Special Projects, Vanderbilt University

The growth of e-business and e-learning markets is forcing higher education to question many of its operating principles. Can the factors that make e-business successful in the corporate world translate to a university? How does e-business fit into an institutional strategy? At this roundtable we will collectively identify issues, share perspectives and discuss alternative approaches.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0079

Effective IT Support: It Starts with Understanding Customer Needs
Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Johnson A

- Carolyn Livingston, Manager, Financial Systems, Tufts University
- Tracy Scharer, Manager, Business Information Services, University

of Virginia

Understanding current needs is important. Anticipating future needs is even more important. Meeting customer needs takes much more than technical expertise. It requires extensive communication, cooperation and patience between academic departments and central IT. At this roundtable we will share information about our successes and challenges.
Roundtable sessions are limited to 20 participants.

Recruiting and Retaining IT Staff: The Crisis Continues ... Or Does It?

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Johnson B

- Bret L. Ingerman, Chief Technology Officer, Skidmore College 👤

The problems of hiring and keeping talented IT staff have been well debated and discussed, and not just within IT circles. Human resources, senior administrators, and even the general public have all gotten involved. Have these conversations yielded tangible results? Have new ideas or strategies been developed to address the problems? This roundtable will provide a forum where we can share our own experiences to try to collectively tackle this thorny issue.
Roundtable sessions are limited to 20 participants.

ERP Systems: Reality Bites

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Cleveland A

- Walter G. Weir, Chief Information Officer, University of Nebraska

What do we do about the changes an ERP system brings to our University? How do we insure continued funding? Appropriate performance metrics? Identifying the return on investment? And creating a functional and technical organization to support and grow the ERP system? Join us as we discuss and try and find solutions to these issues and more.
Roundtable sessions are limited to 20 participants.

Desktop Computing Management: Do We Need to Be Thinner?

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Cleveland B

- Mark C. Sheehan, Executive Director for Information Services and Chief Information Officer, Montana State University-Bozeman 👤

Who needs a new, fully loaded PC when Citrix Metaframe software on a terminal server lets any old PC emulate a hot new one? WebTV, e-mail stations, wireless PDAs, and "Palm-enabled" Websites point the way toward cheap, ubiquitous Internet appliances. Still want that big PC? Come and discuss why and why not.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0076

IT Strategic Planning: Getting It Right

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Cleveland B

- Robert F. German, Jr., Director, Policy & Strategic Planning, University of Virginia 👤

Strategic planning in higher education IT is multi-level, continuous, and often thankless.

It can be incredibly valuable, not only for setting your future direction, but also for confirming the role of IT at your institution's overall planning roundtable. We'll explore how to make it meaningful and how to strike the proper balance between burden and benefit.
Roundtable sessions are limited to 20 participants.

http://www.educause.edu/asp/doclib/abstract.asp?ID=EDU0075

👤 *Click on this icon to see the presenter's biographical information.*

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EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0072
Title:	Advanced Networking: How Much is Enough?
Author:	Philip E. Long
Organization:	Yale University
Year:	2000
Abstract:	College campuses are among the nation's most wired environments in support of teaching and learning. But few networks can reliably deliver comprehensive media for classroom and study use and competition is increasing from non-educational uses such as Napster. We are now adding advanced services such as multicast video and developing wireless LAN environments and many students have data cell phones, pagers and more. How much is enough? Can this fit together? Where are we headed?

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EDUCAUSE 2000 Current Issues Roundtable: HOW MUCH NETWORKING IS ENOUGH

Discussion led and written up by Philip Long, Yale University.

DISCUSSION

- Understand demand
  - Emerging broad band demands such as video conferencing
  - Gaming, entertainment activities
  - "Ubiquity" of small demand applications (e.g., email, MP3) equals high demand
  - Importance of user support in proportion to expanded demands, particularly with new applications
  - What will expand institutional participation?
  - "It's the applications, stupid!"
  - Rising end-user expectations: faculty, students, parents (!), staff
  - Campus culture greatly affects end-user expectations
- Understand network management options
  - Some applications are educationally related, others are not => need to manage?
  - History of modem pools as useful exemplar for demand that exceeds supply and the precedent and need to manage
  - Differential service, quality of service
  - But IP contains no underlying QOS capabilities
  - We will have to live with this reality
  - Any tools for traffic shaping?
  - Coarse or fine grain filtering by source IP or port
  - Policy based management: develop bandwidth limits and monitor "loud talkers"
  - needs well publicized standards on "appropriate network use"
- Understanding capacity expansion options
  - Fiber to the desktop
  - Continued advances in speed
- How much networking is enough
  - Keep ahead of demand?
  - Conform to budget?
  - Meet peer practice?
- Critical question: How do these variables interact?
- Satisfactory networking is an interaction of at least three variables:
  Demand
  Capacity (including function)
  Cost
    - An institution can control any two independent variables
    - but the third will then be uncontrolled
    - For example, if an institution wishes to expand capacity to meet demand
    - cost must be unconstrained
    - If cost is to be constrained, then
    - demand or capacity must be controlled

CONCLUSIONS

- Demand for networking continues to expand, driven by:
  - new program activities such as distance learning, expanded online use by traditional teaching, expanding numbers of cross institution projects (e.g., federally funded) and much more
  - new communications capabilities such as voice-over-IP, IP based vide conferencing and much more
  - improved function such as higher resolution images, bigger screen video

  - changing use patterns favoring persistent connections over periodic connections
  - rising user expectations for reliability and speed
  - rising numbers of connections per user
  - ability of machines to talk to each other, exploding the number of addresses, sources and destinations
  - crude options are available for managing demand
  - blocking sites or ports
  - establishing local policy on bandwidth limits and policing
- Capacity continues to expand based on new technologies
  - and, of course, by increased investment
- Value continues to improve based on communications costs tracking the classic Moore's Law improvements in the underlying electronics
  - But, despite improving price performance, overall network costs continue to rise
- No "visible or invisible hand" is guiding coherence between demand and capacity. Each school needs to establish its own balance of demand with capacity based on local campus culture, budget and related factors.
- What to do?
  - Take whatever steps appropriate to the local culture to manage demand
  - Plan ongoing expansion of network capacity (and budgets) based on campus cultural assessment of "legitimate" needs
- These steps can only be undertaken successfully in the context of a robust planning process
  - Strong faculty participation
  - Full professional staff support
  - Highly visible process
  - Highly visible, well published outcomes including reasoning
  - Educational campaign for end-users on policy and plans

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0074

Title: Electronic Classrooms and Buildings of the Future

Author: Elia Schoomer

Organizations: , Lehigh University

Year: 2000

Abstract:

How many universities and colleges have adequate high technology classrooms and student learning spaces to meet current demands ? With the exponential growth in the use of the Internet and multimedia to support enhanced instructional delivery, student learning, and research; there never seems to be enough high technology facilities available to meet the needs of faculty and students. A critical issue facing our campuses is planning, developing, and supporting new high technology facilities to meet critical demand for teaching innovation, research, and student learning. This session will examine and discuss current issues, problems, and trends related to developing and supporting new high technology classrooms, labs and student learning spaces.

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Educause 2000
Current Issues Roundtable
Moderator: Elia Schoomer, Lehigh University
Electronic Classrooms and Buildings of the Future

Introductory Comments

There are three areas we might want to discuss as we consider the planning, development, and support of technology facilities: Demand for increased installation of technology resources, concerns that follow from these demands, and installation trends.

Demand Factors

- There is a renewed interest in faculty development, with an emphasis on the incorporation of technology in the teaching process. Of course, this push will lead to an expectation of ready access to display technology in the classroom
- In addition, 25-50 technology savvy faculty join our institutions each year. Instructional Technology was part of their curriculum as they passed through college and graduate school. They know how to use technology, they want to use technology, and they expect to see support infrastructure in place (and they most certainly do not like pushing AV carts).
- Web tools for course management and content authoring are becoming easier to use, more powerful, and they are extremely well marketed!
- Presidents, Provosts and Deans are all advocating innovation, academic excellence, competitiveness, etc. In some cases, faculty are being told they WILL innovate. This adds significant pressure for ubiquitous classroom technology resources.
- Computer literate and web-ready, today's students have increasing expectations for more visual and engaging lectures and learning environments.

Demand Problems

- Generally, 25% of classrooms are technology equipped. This leads to a possible:
- disconnect between policy directives from university leadership (more) and the financial resources dedicated to technology infrastructure (not more)
- One-time, continuing, and life cycle resources are not adequate. We are not trying to put $150 overhead projectors in each classroom anymore
- There is limited recognition of the demands these resources place on maintenance budgets and staff. Rooms are easier to add than support staff.
- Faculty who use technology in the classroom have a significant stake in the reliability of these systems. If it doesn't work, they cannot teach. (Our biggest problem used to be no chalk in the classroom).
- In addition, faculty and students have high expectations for technology performance, they want only the highest quality!
- Scheduling of technology rooms is critical: we must maximize the effective use of these expensive technology resources. BUT:
- As we try to get the most our of our investment in technology rooms by maximizing occupancy, we run the risk of loosing access for testing, repairs and preventative maintenance
- Success is also a problem! Faculty who adopt technology in their teaching expect to have continued access to these resources. An instructor teaching in a dual projector room with a document camera is frustrated when these resources are not available for a different course in a different room. As we improve our technology installations, we may be fighting continually rising expectations.
- We must also remember not to neglect the 'pre-technology' classroom basics: adequate lighting and climate controls, attractive wall and floor treatments, comfortable seating,

acoustic isolation from traffic, hallway and other noise sources, adequate board space, (and chalk).

Trends

- There is increasing faculty and student demand for powerful, technology-rich teaching environments, including:
  - Multiple projection systems
  - Simple and intuitive control systems (rather than training)
  - flexible and abundant inputs to the system: VCR, CD, DVD, Doc cam, Smart-type board, fixed PCs, and laptop inputs
  - Wireless controls to free faculty from the instructor station.
  - Direct interaction with the projected image through SMART-type systems.
- Increased connectivity to the classrooms with higher bandwidth (I2) will facilitate access to real-time, high quality audio and video, make remote instrumentation possible, and will lead to classrooms without walls: anyone, from anywhere, can participate in the teaching/learning process
- Class size is changing with both bigger AND smaller classes as instructional models shift. We have tended to neglect the development of technology resources in our smaller rooms, concentrating on large rooms where we get more 'bang' for the buck.
- There will be pressure (we hope) towards evaluation of technology usage, in terms of utilization of technology resources and their effectiveness in the instructional process.
- A trend towards learner-centered rather than instructor-centered classroom teaching and towards collaborative rather than individual learning. Both of these trends will have an impact on the types of facilities that we are required to design and support:
  - flexibility in seating, as students move from lecture to discussion, to small group collaboration and back again during the course of a single class meeting
  - Wireless connectivity for student laptops (based, of course, on enhanced battery power or battery exchanges for student systems.
- This trend also leads to a need for different types of learning spaces including:
  - Presentation practice rooms
  - Rooms with teleconferencing resources for collaborative e-meetings
  - Access to resources in common areas including the evolution of a learning community that requires 24 hour access to technology resources, including support staff, and even a 'cyber café'
  - Faculty access to professional media development assistance and production resources
- A move towards more interactive teaching models. Even in large classes, technology offers faculty opportunities to engage the class (live polling, for example a la "Who wants to be a Millionaire", or the ability to give students the 'floor' during a class in a PC lab using software solutions).
- Collaborative consortia, virtual departments, and other aspects of on-line and distance learning will have an impact on technology infrastructure and class size.
- There will be bottom-up AND top-down pressure to use (and recognize the users of) technology enriched instruction. Students and academic administrators will expect faculty to seek out the best practices for enhanced instruction. Promotion and tenure models will have to be adjusted to reflect this emphasis on instructional innovation. Instructional technology tools will become part of the instructional base, and faculty will be expected to learn and use these resources.
- It is hoped that this transition will not be too hard. Instructional Technology is 'addictive', that is use of a simple CI class page, where faculty are 'required' to post their syllabus and assignments, almost inevitably leads to use of threaded news readers, chat rooms, on-line

assignments, and technology enhanced presentations. Further, once addicted, an innovative faculty member tends to become a technology pusher: "it was great, try it you'll like it".

Some Questions for Consideration:

- How can we meet rising demands and expectations for instructional technology (financially and in terms of support)?
- Just what are these demands, anyway? Do we REALLY know what our faculty want and need? What steps are we taking towards assessment and evaluation of our technology resources?
- How do our students learn best? We have been teaching a specific way for hundreds of years. We wouldn't do this if it didn't work. What is all the fuss about?
- If you are making a major thrust towards new fixed installations, what will you do in 5 years when it all breaks?
- Are we maximizing effective use of expensive technology resources through aggressive matching of faculty with resources? Is our technology room occupancy rate sufficiently high?
- What should we put in our rooms? Will basic technology rooms (already difficult to fund and support) become unsatisfactory to an increasing cadre of IT savvy instructors with technology rich syllabi? How do we define 'highest' quality. How much should we spend on resolution, bandwidth, input device flexibility?
- What is the life cycle of these rooms? Is the life cycle determined by equipment life or by changing instructional parameters?
- What about distant teaching? Are students, faculty or lecturers always going to be on campus? Should teleconferencing resources be part of more classroom designs?
- How do we balance the need to maximize utilization with the need for access to facilities for inspection and maintenance?
- How do we assess our facilities? Are faculty using these resources? How do our students want to learn? Are we meeting their needs? Do students learn better in a rich visual environment?
- Are our classes getting bigger? Smaller? Both? How will this influence new classroom construction? Are we building out or in?

Comments Collected from the Discussion

- Classroom inventories aid in strategic planning, also, these inventories should lead to the development of descriptions of classroom 'types'. These clear and simple descriptions assist the registrar in matching faculty to facility and also can serve as starting points for specifications of requirements for new facility planning.
- Faculty input is important to the process of design
- There is an ongoing need for support and training and documentation
- Some faculty prefer to use laptops in the classroom, others prefer a fixed PC. There was no consensus.
- Technology room standards (technology features, equipment specification, room layout, suggested service provider, etc.) should be developed for the institution. Standardized rooms are easier to maintain, easier on the registrar, and easier for faculty to become comfortable with.
- These room standards should be made available to departments developing 'private' technology facilities. Somehow, these rooms always come back to haunt centralized service groups, and the closer they are to the standard, the fewer the problems later on.

- While there was agreement that we tend to be more aggressive with installation of technology in larger rooms, some folks have installed some smaller rooms. Small room features include:
    - Tables on wheels or
    - Furniture Pods
    - Raised floors with ac and LAN jacks or
    - Wireless LAN support
    - Smart Boards
    - Built in projection systems or
    - Roll-in projection systems
    - Roll-in laptops
    - Bean-bag chairs
- Overall, current design trend appears to be towards support for laptops at student seats (wired or wireless), flexible seating, multi-function facilities
- Hotlines to support staff for help with technology rooms are recommended
- To determine optimal room setup (furniture), look at how the furniture tends to be left after classes. Use this for the 'default' setup in flexible classrooms
- When designing facilities, be sure instructional technology staff has input before space layout is completed (for example, seminar rooms don't work well if there is one group of students encircling a table, and a second group behind them). Architects seem to lack sensitivity to functional IT requirements.
- As there was significant interest in this topic, other professional organizations and conference venues for the exploration of classroom technology and facility design issues were suggested: CCUMC (http://www.indiana.edu/~ccumc/), the Society for College and University Planning (http://www.scup.org) and ICIA/INFOCOM (http://www.icia.org/). It was noted that ICIA offers a certification program in facility design and installation.
- Personnel are not as easy to add as classrooms
- High bandwidth connectivity should be part of the base set of resources for new classrooms and lecture halls. Two-way, high quality, video in the classroom may become more common.
- Flat-screen (plasma) displays are seen as too small for classroom use. At this time, most would prefer a projector installation, even in small classrooms
- A wireless mouse should be a basic feature in a technology classroom
- Attendees expressed interest in additional discussions of this sort at future Educause conferences. It was also felt that there was a need for more representation in the conference program for discussions of facilities design and costs and IT delivery to the classroom issues. There was some interest in continuing the discussion on-line or even the development of a web site to house strategic, tactical, operational, and facility plans.

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0081
Title:	Electronic Learning Environments: Assessing Educational Outcomes
Author:	Scott Macklin
Organization:	University of Washington
Year:	2000
Abstract:	Science and industry are exponentially improving the methods by which information can be collected, assembled, edited, upgraded, archived, displayed, distributed, and accessed interactively. In what ways can the progressive innovations in information technology enhance the outcomes of our educational efforts? Join us for a session for a discussion concerning assessment strategies regarding teaching and learning with technology.

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Electronic Learning Environments: Assessing Educational Outcomes
EDUCAUSE 2000 Current Issues

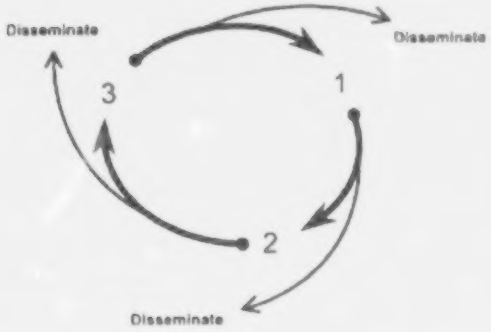
Science and industry are exponentially improving the methods by which information can be collected, assembled, edited, upgraded, archived, displayed, distributed, and accessed interactively. Now is the time to ask, "In what ways can the progressive innovations in information technology enhance the outcome of our educational efforts across the full spectrum of the University's missions?" Educational technology has the potential to contribute enormously to meeting challenges facing us today, significantly enhancing both teaching and learning. In order to achieve this promise, there must be an intimate coupling between the evolution of educational technology and the evolution of educational practice and educational science: each must inform the other, in a continuous cycle. Taking a cue from the June 14 NLII focus session on "Transformative Assessment", this Current Issues session will focus on the iterative process of development and assessment of next generation technologies and strategies for teaching and learning by discussing the following questions:

- What is the nature of the desired transformation of teaching and learning (what is the vision, and what measures would show our progress toward that desired state)?
- How can assessment be used to plan for, guide, motivate, or evaluate systemic transformation of teaching and learning?

Assessment and evaluation techniques need to be in sync with and inform contemporary educational practice in the development of learning environments where inquiry is the norm, a focus on problem solving, and thinking critically is part of the process.

Possible Outcomes:

Further the conversation through NLII focus sessions and by working with recently formed Center for Applied Research to engage in the research and development of Educational Impact Assessments: not a sequence of discrete events but rather a whole dynamic ecology under investigation. EIAs take into account that at this point there is no social equivalent to Moore's Law. Recent exponential growth in the development of educational technologies has no been matched with equal growth in a quality research base of informing effective practice.



1.Characterize the exemplar project
2.Research the technology in use
3.Refine the tools and practices

•Give shape to the field by characterizing the educational efforts of exemplar projects, in terms of learners, learning domain, instructional approach, and structure of the learning environment.

- Transform portions of our process and/or results into tools, resources, and techniques that can be made available for educators
- Present results from the investigations at local and national scholarly meetings and scholarly publications

Reading List

Angelo, Thomas. Doing Assessment as if Learning Matters Most
http://www.aahe.org/Bulletin/angelomay99.htm

Boyer Commission on Educating Undergraduates in the Research University. 1998. Reinventing undergraduate education: A Blueprint for America's Research Universities.
http://notes.cc.sunysb.edu/Pres/boyer.nsf/webform/overview

Reeves, T. New Approaches to Assessment and Evaluation in Digital Learning Enviroments
http://www.ccnmtl.columbia.edu/cu/ccnmtl/services/forums/evaluation

Salomon, G. (1991, August). Transcending the Qualitative---Quantitative Debate: The Analytic and Systemic Approaches to Educational Research. Educational Researcher, 1-18.

Shepard, Lorrie (2000) The Role of Assessment in a Learning Culture. Educational Researcher, Vol. 29, No. 7, pp. 1-14.
http://www.aera.net/pubs/er/arts/29%2D07/shep01.htm

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0077
Title:	Enterprise Information Portals
Author:	David W. Koehler
Organization:	Princeton University
Year:	2000
Abstract:	Portals have certainly hit the issue list in a big way. Everyone seems to be planning or implementing a portal. What do you need to know to be successful? What's all the hype about anyway? Does your campus work best with the free model, or by buying the tools to implement or by developing your own? What's the story on the shareware portals from Java SIG and Apache? Do you expect to have one portal or many on your campus? What are the architectural considerations to enable portals on your campus?

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Enterprise Information Portals

David W. Koehler, Princeton University

This session was attended by approximately 40 individuals. Several of the campus representatives had already implemented a portal product. Most wanted more information about the challenges and opportunities.

The group agreed that it was not too early to get involved. Many of the portal vendors, especially those who concentrated on the "free with advertising" model, would be losing out in the long run. Those vendors that aligned themselves with applications (Campus Pipeline, Jenzabar, etc.) would have the most chance for success. It was agreed that the JA-SIG uPortal framework offered many campuses a good jumpstart.

The group decided that there would be two different views of the campus web.

For the visitors, the current home page with pointers would work just fine. For the campus community (loosely defined), it would be extremely beneficial to offer a "my.campus" solution to allow individuals to customize their view of events, information, and tasks.

Some of the issues that were discussed were:

Single sign-on possibilities
Levels of authorization required
The need for a calendaring service
The ability to cement the product by levels, e.g. schools, depts, groups,
The strong recommendation to make sure that the architecture is robust
Interfacing with your data warehouse would offer a valuable service
Providing administrative data in "channels" was the real benefit for the campus

There was a strong interest in this topic. It may require a followup session at the next EDUCAUSE meeting.

EDUCAUSE Information Resources Library
Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0078
Title:	E-Business: Is It Any Less Complex in a Small College?
Author:	Barbara E. McMullen
Organization:	Marist College
Year:	2000
Abstract:	Conducting college business electronically impacts operating efficiency, the value of education, and competitive advantage. After ensuring a common vocabulary, participants brainstorm on what colleges can do short- and long-term with e-business strategies. The focus is on complexities that hamper deployment, what can be accomplished, the potential, and barriers to success.

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Educause2000
Current Issues Roundtable

E-Business: Is It Any Less Complex in a Small College?

Facilitated by:

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THE TOPIC

Conducting college business electronically impacts operating efficiency, the value of education, and competitive advantage. After insuring a common vocabulary participants brainstormed what colleges can do short and long term with e-business strategies. The focus was on complexities that hamper deployment, what can be accomplished, the potential, and barriers to success.

WHAT HAPPENED???

The Internet belonged to education. Education and government were the first constituencies to explore cyberspace. When the World Wide Web appeared, others started to understand the possibilities of the new and exciting communication technology. The business community learned rapidly that they could enhance their newly created e-storefronts with end-to-end solutions that tailored their business processes, created new efficiencies, and found new markets and relationships. The business community moved aggressively. Education did not. This is the premise that was used to begin the discussion.

THE LINGO

The group was very mixed and with very different interests in the topic. We briefly discussed some of the terminology associated with the topic including:

E-Business: It's about business, not technology. E-business isn't about re-inventing your business. It's about streamlining your current business processes to improve operating efficiencies, which in turn will strengthen the value you provide to your customers -- value that cannot be generated by any other means, and value that will give you a serious advantage over your competition. (from IBM E- Business Web site).

E-Commerce: Electronic transactions that move money from one place to another, in the conduct of business.

E-Learning: Distance and distributed learning.

Frequently Used Terms – how do we define them for our use?

B2B
B2C
Digital signatures

Customer Relationship Management (CRM) – how does this relate to knowledge management and life-long learning?
Enterprise Resource Planning (ERP) - back office systems such as billing, procurement (purchase orders), accounts receivable, payroll, human resources, etc.
Data warehousing, digital libraries, Metadata, XML

MATRIX

The matrix attached was used to help our discussion. Prior to starting work to understand the complexities of the topic we addressed several questions that were written on the flip chart. Everyone was asked what ebusiness applications their colleges are doing. Everyone was asked what ecommerce applications his or her colleges are doing. Everyone was asked if they have emerging technology and ebusiness/commerce R&D going on. Except for distance education, the group agreed that little if any was being done in these areas in the small college.

We agreed that colleges and universities are complex with diverse missions. Incorporating e-business/commerce methods into these organizations is transforming. To be successful the institution needs to focus as a whole on the user and be creative, flexible and willing to share turf with other campus units to reengineer institutional processes. The matrix presents the dichotomous environment we are familiar with in educational technology – that of administrative technology and academic technology. We explored a variety of things including similarities and differences between business and education and how the relationships in our educational institutions could change to take advantage of the benefits of the new technologies.

We started to work through the matrix using distance education as an example. We started to determine what part of it belonged in each category. The group was more inclined to discuss the subject broadly rather than focus on any particular application and its problems so we moved on to a general discussion.

DISCUSSION TOPIC

Below are listed a variety of e-commerce factors and a discussion topic that was posed to the group. We discussed how some of these factors affect the quality of education in the virtual e-campus, where the e stands not for education but for e-commerce? ***Our focus was on the small college and the group was asked to remember their mission***.

Factors to consider:

- Paradigms: business within a university, policies, learning market space, e-academia systems, electronic assets, sharing knowledge
- Support: funding, business, research, recruiting, diversity
- Materials: publishing, access, digital libraries, other resources
- Competition: students, instructors, corporate talent, course offerings, other universities, degree programs, certificate programs, training vs. degrees
- Others

Discussion topic posed:

The issues relating to e-commerce in academia are complex and sometimes hidden. Industry is designing the new economy. The new economy is driving movement towards a new social order. Should not the academy be leading people into the new social order? If so, then how can academia and industry move together? When we talk about e-ducation in the future, will it be a little e- or a big E?

SUMMARY

We discussed the following topics in our attempt to summarize the session. Although discussion was spirited, diverse, and stimulating, time did not permit firm conclusions. Rather than conclude, we chose to delve further into discussion around the topics in a freeform fashion.

- **Complexities that hamper deployment**
- **Barriers to success**
- **What can be accomplished now?**
- **What is the potential?**

EBUSINESS/COMMERCE IN EDUCATION

	E-business	E-commerce
Academic technology		
Administrative systems		

EDUCAUSE Information Resources Library

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0080

Title: Distance Education: How Do You Know It's Right for Your Campus?

Author: Ellen Y. Borkowski

Organization: University of Maryland

Year: 2000

Abstract: Universities and businesses alike are "going online." How do you determine whether or not your institution should move to distance education? Large or small, public or private -- what issues should be examined in making this decision? Join us for a session to discuss and share experiences and questions around making the decision to go or not to go into distance education.

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Distance Education: How Do You Know It's Right for Your Campus?

Current Issues Roundtable
Thursday, October 12
4:45 p.m. - 6:00 p.m.
Cleveland B

Ellen Y. Borkowski, Director, Technology Enhanced Learning, University of Maryland

Universities and businesses alike are "going online." How do you determine whether or not your institution should move to distance education? Large or small, public or private -- what issues should be examined in making this decision? Join us for a session to discuss and share experiences and questions around making the decision to go or not to go into distance education.

Those who attended this roundtable discussion included people who were considering moving into offering distance education programs and those who were already offering online programs. A larger percentage were those who were just getting started and wanted to find some "answers." There was a mix of small private institutions to larger public institutions. Overall, discussions were around different issues that people should be considering when trying to decide whether to start an online program. Discussions started off around the topics of cost-effectiveness, defining distance education and quality of online courses. In trying to define quality, a list of core technologies were offered by one participant - print, voice, video, data, and feedback. It was noted that feedback is key and directly related to quality of an online course. Some example programs offered by another participant were the Educational Technology Program at George Washington University and Cisco online training programs. Discussions around quality of service were discussed - providing the same level of service for on campus students as for online students. It was noted that it is important to include student services such as advising. For faculty support, providing instructional design services for faculty is important along with providing information on other resources such as publisher material. The technical infrastructure for supporting online courses was raised along with the issue of technical support needing to be a "one stop shopping" service. Discussions around funding included how to offer financial aid for online students and dealing with tuition rates. It was pointed out that for some institutions, decisions about tuition and direction of online programs are affected by the mission of the particular institution. In discussing potential markets for an online program, it was suggested that people look into organizations that offer accreditation for professionals or ongoing credits for K-12 teachers. The key is to understand the needs of your constituency to determine what programs to offer that would be unique to your institution's mission. There was an active discussion about offering undergraduate versus graduate online programs. Some felt that offering undergraduate online programs would take away the "undergraduate experience" - students would be missing out on socialization and building of community that occurs on campus. Some participants were feeling the pressure of moving towards online programs because "this is the way the world is going." The discussion ended with a pointer to

- Cost effective?
  - Chronicle article - cost analysis (do a search on the Chronicle site for cost analysis)
  - Online Learning (another online journal to search)
- Definition
  - Distinguish supplemental & fully online
- Quality?
- Example programs
  - GSU Ed Tech Program (web-based)
  - Cisco online training
- Core technologies (driven by instructional objectives)
  - Print
  - Voice
  - Video
  - Data
  - Feedback**** related to quality
- Faculty Support
  - Instructional design
- Quality of Service
  - Same for residential and online
- Look for advice from Extended Studies organization
- Publisher material
- Student Services
  - Including advising
- Technical Support
  - One stop shopping
- Technology Infrastructure
- Accreditation
  - Online versus on campus
- Financial Aid for online students
- State Legislature requirements
  - Out of state/in-state tuition
- Potential sources
  - Accreditation for Professionals
  - Ongoing credits for K-12 teachers
- Service mission - ladn grant
- Focus on programs you do well
- "Fighting Walmart"
- Unique product/unique to mission
- Graduate vs undergraduate onlihne?
  - Undergrad experience
  - Missing socialization
  - Missing building community
- Feel pressure - this is the way the world is going
- Start with hybrid courses?
- Is DL just a delivery system?

Reference: "Information Ecologies"

Need to understand your constituency
Lose ability to get emotions/atmosphere across
Offering "some" level of service versus no service

EDUCAUSE *Information Resources Library*

Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0073
Title:	Funding IT: When Does Outsourcing Make Sense?
Author:	S. Alan McCord
Year:	2000
Abstract:	Many institutions struggle with funding IT infrastructure, services, and strategic projects. Outsourcing can address both service delivery and funding, but care must be exercised to find outsourcing opportunities that best match institutions to vendors. At this roundtable, participants will explore the advantages and disadvantages of outsourcing, and will share their experiences in selecting and administering outsourcing relationships.

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Funding IT: When Does Outsourcing Make Sense?

EDUCAUSE 2000
Current Issues Roundtable Meeting Notes
October 12, 2000

Facilitator:
Alan McCord, Associate University Chief Information Officer, University of Michigan

Participants:

David Dobbins, University of Iowa (david-dobbins@uiowa.edu)
Gary Foley, Orangeburg-Calhoun Technical College (foleyg@org.tec.sc.us)
Doug Gale, OARnet (dgale@oar.net)
Gary Hammon, Boston College (hammong@bc.edu)
Tony Holland, Stanford University Graduate School of Business (tholland@gsb.stanford.edu)
Brad Kern, Mi8 (Brad.Kern@Mi8.com)
MaryJac Reed, Fairfield University (mreed@mail.fairfield.edu)
Dave Vernon, Cornell University (rdv2@cornell.edu)

Overview:
Many institutions struggle with funding IT infrastructure, services, and strategic projects. Outsourcing can address both service delivery and funding, but care must be exercised to find outsourcing opportunities that best match institutions to vendors. At this roundtable, participants will explore the advantages and disadvantages of outsourcing, and will share their experiences in selecting and administering outsourcing relationships.

Examples of Challenges:
1. Recruitment and retention of qualified staff
2. ERP systems implementation
3. E-commerce, portal technology, web-enablement
4. Infrastructure implementation and maintenance
5. Computer procurement
6. User and technical support
7. Limitations of legacy funding and budgeting models

Examples of Sourcing Options:
1. Traditional "macro-sourcing"
2. Micro-sourcing
3. Traditional contract services
4. Application service providers
5. Internal sourcing via federation
6. Mixed models

Funding IT: When Does Outsourcing Make Sense?

EDUCAUSE 2000 – Current Issues Roundtable Meeting Notes

Suggested Topic Areas for Discussion:

1. Objectives of sourcing initiative
2. Anticipated advantages and challenges
3. Vendor selection process
4. Contract administration process
5. Outcomes of the sourcing initiative
6. Lessons learned

Issues/Topics Identified by Participants:

1. How can institutions with small budgets and staff appropriately source services to maintain an appropriate level of network infrastructure (wiring plant, network design, network administration)?
2. How do you measure the values and estimate the administrative needs when sourcing using mixed models (insourcing, outsourcing, ASPs, federated services)?
3. How do we incorporate sourcing decisions into capital budgeting processes?
4. When we say, "we can't outsource strategic services," do we need to question traditional assumptions about which services are strategic?
5. What internal measures and costing metrics do we need to employ to provide baseline data for use in making outsourcing decisions?
6. What are the issues faced by traditional service organizations that find themselves in the role of an outsourcing service provider to other organizations?
7. How do institutions and potential vendor providers work together to identify the actual institutional cost structure, service level definitions, capacity planning methods, and other measures?
8. What are the necessary "dos" and "don'ts" of outsourcing activities?
9. When and how should institutions outsource in conditions where appropriate levels of staff expertise are not available?
10. Are there a suite of services which are more likely to yield service level or cost advantages when outsourced?

Discussion:

1. Doug Gale outlined the cost structure developed for a large outsourcing contract. The model included an estimate of FTEs required to perform the set of tasks associated with the agreement, an "uplift" factor (i.e. profit margin), corporate overhead, management fees for equipment purchased by the outsourcing vendor, hardware and software costs, and an inflation factor.
2. Outsourcing decisions can be driven by cost, the need for "speed to market," institutional capabilities, and the "worry factor" associated with critical projects.
3. Candidate services for outsourcing include e-mail services, server and network operations, 7x24 help desk services, network security, wiring infrastructure, network operations, network engineering, and planning and management services. Most of these services occupy the "lower layers" of the IT architecture.

4. It appears that outsourced services are now starting to "move up the stack" to include services previously thought to be strategic. Recent outsourcing decisions by the Navy and NSA underscore this trend.
5. Outsourcing "dos" and "don'ts" focus on these areas:
    a. Do spend time defining appropriate service levels.
    b. Do hire a full-time contract administrator.
    c. Do use or hire an experienced negotiator during contract negotiations. Remember that outsourcing vendors do this for a living.
    d. Do maintain a core staff of specialists to maintain knowledge of key systems and to support bringing services back in-house at the end of the agreement.
    e. Don't sign long-term contracts (example cited of a ten year agreement for outsourcing administrative systems).
    f. Don't enter into an outsourcing agreement without a plan to insource services at the end of the agreement.
    g. Don't ignore or underestimate the impact of outsourcing agreements on institutional culture (e.g. salary differences, conflicting loyalty, fear of being fired).

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0079
Title:	E-Business: Challenges in the Research University
Author:	Jennifer T. Cobb
Organization:	Vanderbilt University
Year:	2000
Abstract:	The growth of e-business and e-learning markets is forcing higher education to question many of its operating principles. Can the factors that make e-business successful in the corporate world translate to a university? How does e-business fit into an institutional strategy? At this roundtable we will collectively identify issues, share perspectives and discuss alternative approaches.

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E'2000 Current Issues Roundtable: E-Business Challenges in the Research University

The questions and discussion topics covered by this roundtable group illustrated the current state of e-business maturation in higher education. For example: Where and how do institutions begin to explore e-business applications? If you already have an e-business strategy underway, how do you address the many technical, business, policy and procedure questions across the institution? To support this broad spectrum of e-business issues and provide a useful focal point to share experiences a new EDUCAUSE Constituent Group was proposed that would focus on understanding and managing the changes facing large institutions -- especially those with a research focus. The group discussed and identified the many facets to e-business as they encompass a number of technologically challenging areas, including e-commerce, distributed administrative and student information systems, distance and distributed learning, campus infrastructure upgrades, consortial arrangements, entrepreneurship, and the building of entrepreneurial portals for their research capabilities. It was clear from the experiences of the group that management and leadership of e-business ventures is equally challenging.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number: EDU0076

Title: Desktop Computing Management: Do We Need to Be Thinner?

Author: Mark C. Sheehan

Organization: Montana State University-Bozeman

Year: 2000

Abstract: Who needs a new, fully loaded PC when Citrix Metaframe software on a terminal server lets any old PC emulate a hot new one? WebTV, e-mail stations, wireless PDAs, and "Palm-enabled" Websites point the way toward cheap, ubiquitous Internet appliances. Still want that big PC? Come and discuss why and why not.

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Desktop Computing Support: Do we need to be thinner?

Mark C. Sheehan, Montana State University-Bozeman

The group included 20-25 people. Discussion was centered around Windows Terminal Server technologies—Citrix Winframe as it is delivered with Microsoft Windows NT version 4.X Terminal Server Edition and the Citrix Metaframe add-on—with only very brief forays into Unix X-based thin client technologies and personal digital assistants such as Palm Pilots. We spent most of our time on the following issues:

Cost savings of thin client solutions. Our general impression was that Windows Terminal thin client rollouts do not result in hardware cost savings, even over the long term. They can, however, result in substantial reductions in support costs if implemented carefully. They are particularly suited to diverse, poorly controlled computing environments, such as home or dorm room PCs. They are of less value in centrally maintained, tightly controlled contexts such as student labs or office blocks.

Other benefits of Windows Terminals. Windows Terminal implementations can extend the life cycle of desktop applications by providing all users with the same version of an application. If the environment is uniform it is less susceptible to frequent, unnecessary, marketing-driven version upgrades. Windows Terminals facilitate remote access to applications, especially secured applications that may be accessed only from a limited range of network domains. Windows Terminals provide the only truly stable access to Windows applications for Mac and Unix workstation users. Applications delivered on Windows Terminal Servers provide the same performance to all users, regardless of the power of the desktop workstation; thus they level the playing field for users. (Note from one installation: Microsoft Internet Explorer seems not to be a Windows-Terminal friendly application. It consumes inordinate amounts of CPU resources.)

Questions and Answers.

- From where are files served in a Windows Terminal environment?
  I.e., where can users store their files other than locally?

  No one had an answer to this.

- What are Windows Terminal client license costs (Winframe and Metaframe)?
  Citrix provides a 40% discount to education accounts. Microsoft "key-server" licensing is useful in the Windows Terminal environment.

  Windows Terminal users must each have a Terminal Server license assigned to them for the duration of each session. They may need an NT client license, as well. No one seemed sure.

- What are the security concerns in Windows Terminal environments?
  Windows Terminal Server offers mild encryption.

  NT security on the server can help protect its C: drive.

- Why haven't thin client solutions caught on more in higher ed?
  A rapid pace of change in this area has meant a decrease in standardization, making many thin client solutions insular and proprietary (and thus unattractive).

  Resistance to change has been a major factor. People expect to have a "full" PC on their desks.

  There are significant barriers to entry into the market. Terminal servers, for example, are expensive to purchase, maintain, and support. Terminal server technologies are necessarily more complex than either stand alone servers or PCs.

There is resistance to "returning" to the dumb terminal environment.

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Transforming Education Through Information Technologies

Abstract

Category: Papers Presented at EDUCAUSE annual conferences

ID Number:	EDU0075
Title:	IT Strategic Planning: Getting It Right
Author:	Robert F. German, Jr.,
Organization:	University of Virginia
Year:	2000
Abstract:	Strategic planning in higher education IT is multi-level, continuous, and often thankless. It can be incredibly valuable, not only for setting your future direction, but also for confirming the role of IT at your institution's overall planning roundtable. We'll explore how to make it meaningful and how to strike the proper balance between burden and benefit.

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IT Strategic Planning: Getting It Right

Current Issues Roundtable

Robert F. German, Jr.

Here are highlights of observations and points made at the session (not edited for consistency, because some of our observations were in conflict with each other):

The primary goal of strategic planning should be two-way communication; the plan is less important than the planning.

A formal process for strategic planning is valuable.

Strategic IT planning is still valuable, even if the reasonable planning horizon is more like minutes than years.

There are differences that are important to recognize between "budget-driven" strategic planning and "vision-driven" strategic planning.

The product of strategic planning should be "high-enough" in its level to be more or less static, while the product of tactical planning must be continuously revisable.

The degree to which an institution is centralized vs. decentralized largely determines the degree to which that institution can manage and limit deviation from its strategic plan.

Adversarial relationships kill strategic planning and render it completely irrelevant.

The first steps to effective strategic planning should include:

(1) development of capacity to do measurement and doing it (including surveys that both measure satisfaction and shape expectations in the community)
(2) development of capacity to define institutional vision and then doing it
(3) development of a formal structure for the strategic planning process, then implementing it

However, strategic planning is a continuous, dynamic process that must be flexible if it is to remain relevant.

EDUCAUSE 2000 PROCEEDINGS

EDUCAUSE 2000 HOMEPAGE

EDUCAUSE 2000 October 10-13
PROGRAM • REGISTRATION • CORPORATE PARTICIPATION • HOTEL & TRAVEL Nashville

Converging/Emerging in the 21st Century • Coming Together in Nashville to Think IT Through

Proceedings and Post-Conference Materials For EDUCAUSE 2000 October 10-13

Pictures from the EDUCAUSE 2000 Conference

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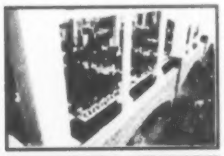

Over 100 computers were used by attendees in the Delta Lobby to access e-mail and the Internet.

Attendees watched product demonstrations at some of the 150+ exhibit booths.

Ports tables allowed attendees to stay connected with their personal laptops.

Poster Sessions allowed one on one networking on a variety of topics.

Attendees enjoyed the fun and excitement of the exhibit hall.

Staying connected to campus while at the the conference was important for many attendees.

Attendees used a new automated registration system which cut the median time in line down to 42 seconds.

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